Economic Concepts

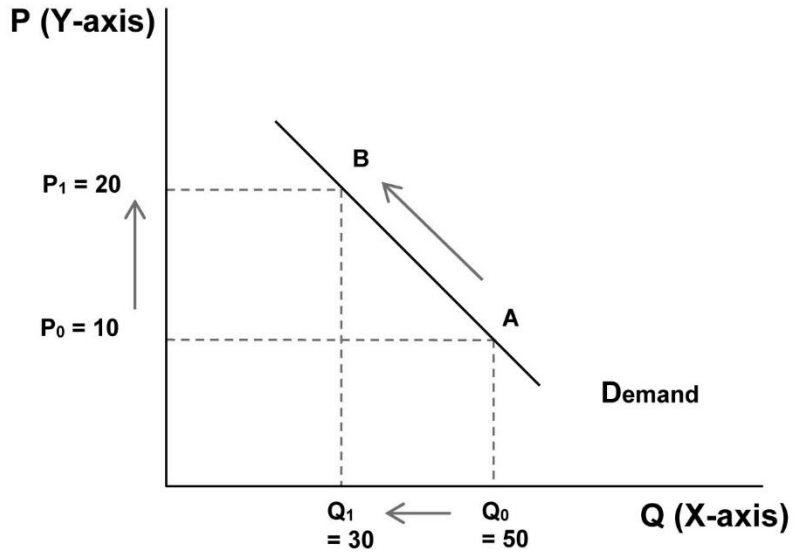
Lecture 1.01 – Microeconomics: Demand Curve

Economics is the study of how we allocate scarce resources to satisfy unlimited wants.

Microeconomics is the study of the decisions of, and interactions among, various individual economic agents (households and firms). Both households and firms act as buyers in the economy, providing **demand** for products (or goods) and services (including labor). Both households and firms act as sellers in the economy, providing the **supply** of products and services. The interaction of demand and supply determine the price, quantity produced and consumed, and the allocation of products and services.

*D*emand (or Demand Curve)—Remember that the demand curve, starting with a D, slopes *Down*, also starting with a D

A **demand curve** shows the *inverse relationship* between the price and the quantity of a product or service that a group of consumers are willing and able to buy at a particular time (i.e., the quantity demanded). For instance, as the price of a product increases (e.g., from 10 to 20), the quantity demanded by buyers decreases (e.g., from 50 to 30).

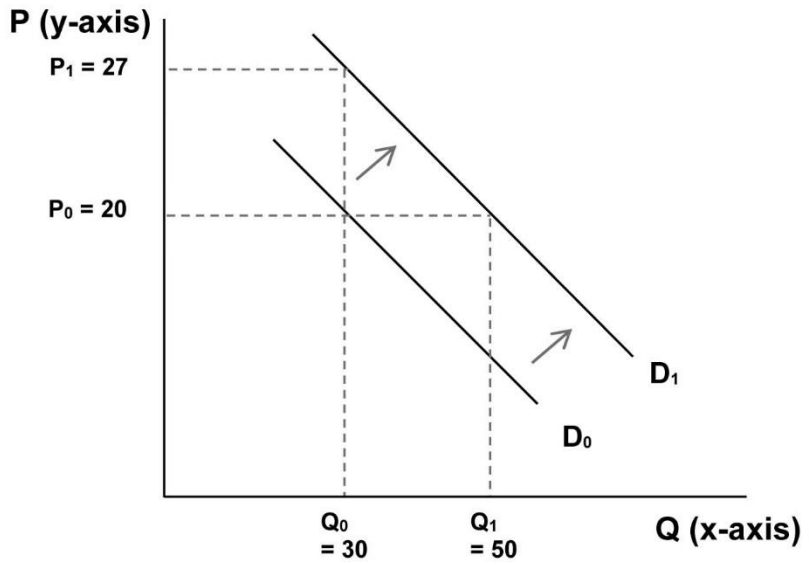


Important tip!!! Economists are very specific about the usage of the terms “demand” vs. “quantity demanded.” The term “demand” refers to the demand curve that can be plotted on a graph with quantity demanded on the x-axis (horizontal) and price on the y-axis (vertical). The demand curve may also be thought of as a schedule listing multiple combinations of prices and quantities demanded (e.g., those for points A and B in the graph). Thus, economists would not say that higher prices decrease “demand.” Instead, economists would say that at higher prices, “quantity demanded” is lower. As prices increase, one moves along the demand curve to find lower quantities demanded.

Price and quantity demanded have a reliably ***inverse relationship***; however, the precise placement of the demand curve on the graph may change regularly. These changes are known as **demand curve shifts**. A demand curve shifts if there are changes in relevant factors *other than a change in price*. Economists use a variety of terms to describe demand curve shifts:

- **Changes in the demand curve where quantity demanded becomes larger for each and every price** are described as "the demand curve shifted upward," "the demand curve shifted outward," "the demand curve shifted to the right," or "demand increased."
- **Changes in the demand curve where quantity demanded becomes smaller for each and every price** are described as "the demand curve shifted downward," "the demand curve shifted inward," "the demand curve shifted to the left," or "demand decreased."

Below we show an upward demand curve shift from D_0 to D_1. Note that at a price of 20, consumers are willing and able to purchase 50 instead of 30 units. Alternatively, for a quantity of 30, consumers are willing and able to pay a price of 27 instead of 20.



There are various reasons why demand curves may shift. Some factors exhibit a **direct relationship** with the demand curve, meaning that increases in that factor cause the demand curve to *shift upward* (or demand to increase). Examples are:

- **The price of a substitute good –** When product A may be an acceptable alternative to product B, an increase in the price of product A will make product B more attractive (e.g., some consumers will shift from buying product A to product B). For example, an increase in the price of hamburgers will increase the demand for hot dogs.
- **Expectations of price changes –** Consumers are more likely to buy now if they think prices will increase in the future. For example, if cigarette taxes are expected to double next year, some buyers will bring forward some of their purchases, increasing demand this year until the tax increase goes into effect.
- **Income** (for **normal goods) –** For many goods (e.g., cars or smartphones), when incomes increase (wealth increase), demand increases. Below we point out that not all goods are "normal goods."
- **Extent of the market –** New consumers may increase demand, therefore increasing the size of the market. For example, the removal of trade barriers by foreign governments will

increase the demand for American products that can be exported. A baby boom will increase demand for baby food. A large inflow of immigrants from a country to the U.S. will increase demand for that country's ethnic food in the U.S.

Other factors exhibit an **inverse relationship** with the demand curve, meaning that increases in that factor cause the demand curve to *shift downward* (or demand to decrease). Examples are:

- **The price of a complement good –** When products are normally used together, an increase in the price of one of the goods decreases demand for the other. For example, an increase in the price of chips will cause a downward shift in the demand for salsa.
- **Income** (for **inferior goods) –** For some goods (e.g., used cars), when incomes increase (wealth), demand decreases as consumers shift their spending to other goods (e.g., new cars).
- **Consumer boycotts –** An organized boycott will, if effective, temporarily decrease the demand for a product. For example, members of unions commonly refuse to buy from businesses that are involved in labor disputes.

Changes in consumer tastes may, of course, affect demand but whether demand increases or decreases as a result depends on whether the change in tastes favors or disfavors the specific product. These are said to have an indeterminate relationship. The theory of *derived demand* predicts that demand for the resources used to produce product A is derived from the demand for product A.

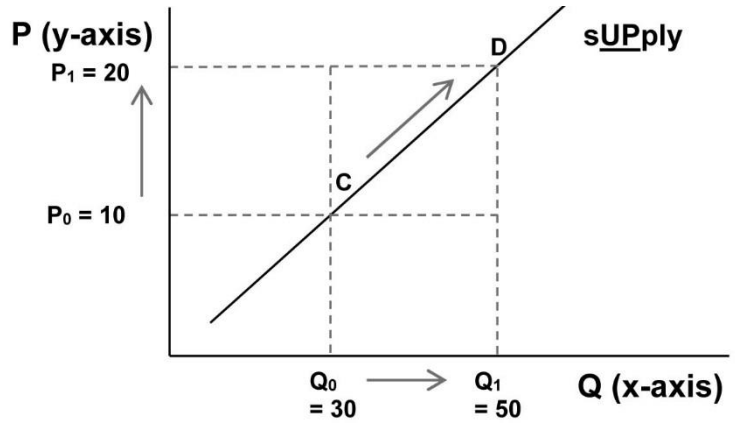
Lecture 1.03 – Microeconomics: Supply Curve

S*up*ply

Remember that the sUPply curve, including the letters UP, slopes up

A supply curve shows the *direct relationship* between the price of a product or service and the quantity that a group of producers and/or sellers are willing to supply at a particular time (i.e., the quantity supplied). For instance, as the price of a product increases (e.g., from 10 to 20), the quantity supplied by sellers increases (e.g., from 30 to 50).

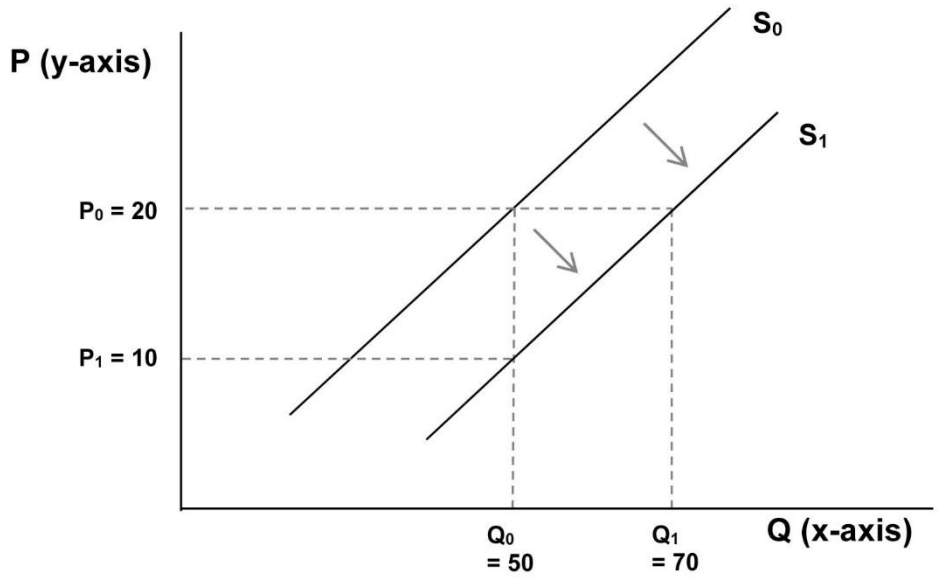
Important tip!!! Economists are very specific about the usage of the terms "supply" vs. "quantity supplied." The term "supply" refers to the supply curve that can be plotted on a graph with quantity supplied on the x-axis (horizontal) and price on the y-axis (vertical). The supply curve may also be thought of as a schedule listing multiple combinations of prices and quantities supplied (e.g., those for points C and D in the graph). Thus, economists would not say that higher prices increase "supply." Instead, economists would say that at higher prices, "quantity supplied" is higher. As prices increase, one moves along the supply curve to find higher quantities supplied.



Just as in the case of demand, the **supply curve shifts** if there are changes in relevant factors other than a change in price. Economists use a variety of terms to describe supply curve shifts:

- **Changes in the supply curve where quantity supplied becomes larger for each and every price** are described as "the supply curve shifted outward" (not upward), "the supply curve shifted to the right," or "supply increased."
- **Changes in the supply curve where quantity supplied becomes smaller for each and every price** are described as "the supply curve shifted inward" (not downward), "the supply curve shifted to the left," or "supply decreased."

Below we show a supply curve shift to the right from S_0 to S_1. Note that at a price of 20, sellers supply 70 instead of 50 units. Alternatively, for a quantity of 50, sellers charge a (lower) price of 10 instead of 20.



Some factors exhibit a **direct relationship** with the supply curve, meaning that increases in that factor cause the supply curve to shift outward (or supply to increase). Examples are:

- **Number of producers –** More producers normally increase the quantity supplied of a product at a given price. Entry by foreign suppliers into the U.S. auto market increases the supply of cars in the U.S.
- **Government subsidies –** Additional funding permits producers to purchase more inputs and, thus, increase quantity supplied at any given price.
- **Price expectations -** If producers expect higher prices, producers will increase their quantity supplied at any given price.
- **Technological advances** – Technological advances generally reduce production costs; hence, producers generally will increase their quantity supplied at any given price with an increase in technological advances.

Other factors exhibit an **inverse relationship** with the supply curve, meaning that increases in that factor cause the supply curve to *shift inward* (or supply to decrease). Examples are:

- **Increases in production costs (e.g., production taxes) –** If producers' costs increase, producers will decrease their quantity supplied at a given price.
- **Prices of other products –** If producers may produce both product A and B, and producing A becomes more profitable, producers will decrease their quantity supplied of B at any given price.

Price Elasticity of Supply

A measure of how sensitive quantity supplied of a good or service is to a change in price or cost. Tells us how a change in prices will affect the quantity supplied by firms.

$$\textit{Price Elasticity of Supply (Es)} = \frac{\textit{Percentage change in } \textbf{\textit{Quantity Supplied}}}{\textit{Percentage change in } \textbf{\textit{Price}}}$$

(Elasticity of Supply)

Owners of factors of production (labor, natural resources, capital, and entrepreneurship) aim to shift those factors to their most productive uses. These efforts are reflected in **economic rents** or

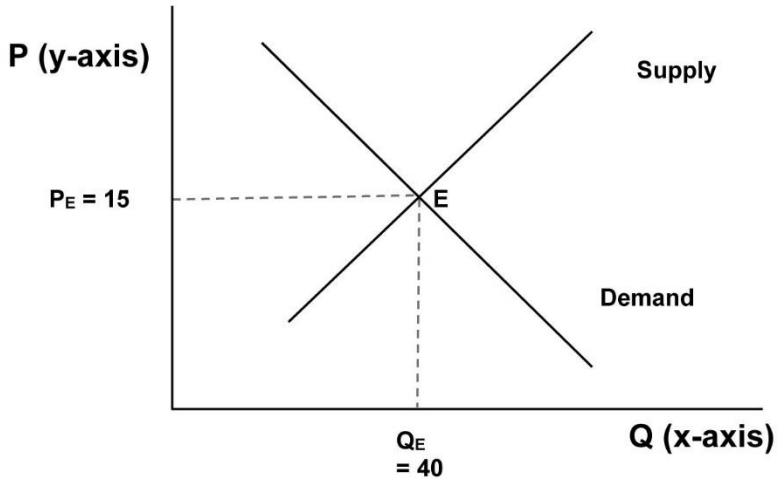
surpluses, which are the excess of the payments for these factors when used most productively over their best alternative use, which is known as the opportunity cost.

Opportunity cost is also known as the benefit given up from not using the resource for another purpose (the foregone benefit from alternatives NOT selected). For example, if a worker accepts a job paying $60,000 instead of another offering $50,000, the worker would have received an economic rent of $10,000 from accepting the higher paying job, and faced an opportunity cost of $50,000 by doing so.

For suppliers themselves, **economic profit** refers to the excess of the profits they are receiving over the **normal profit rate** in the economy. Economic profits usually result in more suppliers entering the market, and economic losses will usually result in suppliers exiting the market.

Market Equilibrium

Generally speaking, prices, quantities supplied, and quantities demanded adjust to an equilibrium level, as long as governments do not interfere, where the demand and supply curves cross, so that there is adequate supply to satisfy buyers and adequate demand to allow suppliers to sell their output. Point E (with a price of 15 and a quantity of 40) in the graph below identifies such an equilibrium point. At the equilibrium price: ***quantity demanded = quantity supplied***, so all the goods offered for sale will be sold.



Some Government Actions that Affect Equilibrium

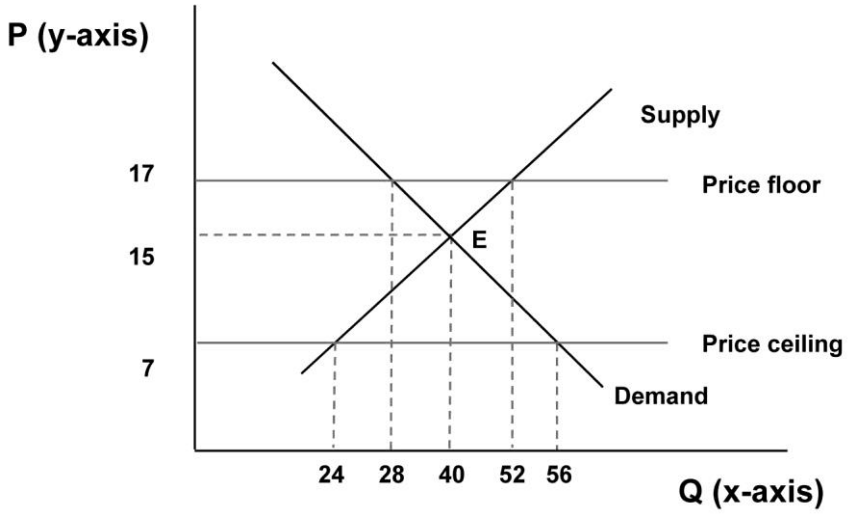
If governments impose a **price ceiling** (e.g., setting the maximum legal price at which a product or service may be sold at $7) below equilibrium (i.e., $15), the quantity demanded (i.e., 56) will exceed quantity supplied (i.e., 24), resulting in *shortages of goods* (i.e., 56 – 24 = 32 is the number of units that consumers would like to purchase at that price but are unable to; the lower line in the graph below represents the price ceiling and helps identify the various quantities).

For example, some cities set maximum rents that result in apartment shortages.

If governments impose a **price floor** (e.g., setting the minimum legal price at which a product or service may be sold at $17) above equilibrium, the quantity supplied (i.e., 52) will exceed quantity demanded (i.e., 28), resulting in unpurchased *surpluses of goods or services* (i.e., 52 – 28 = 24 is the

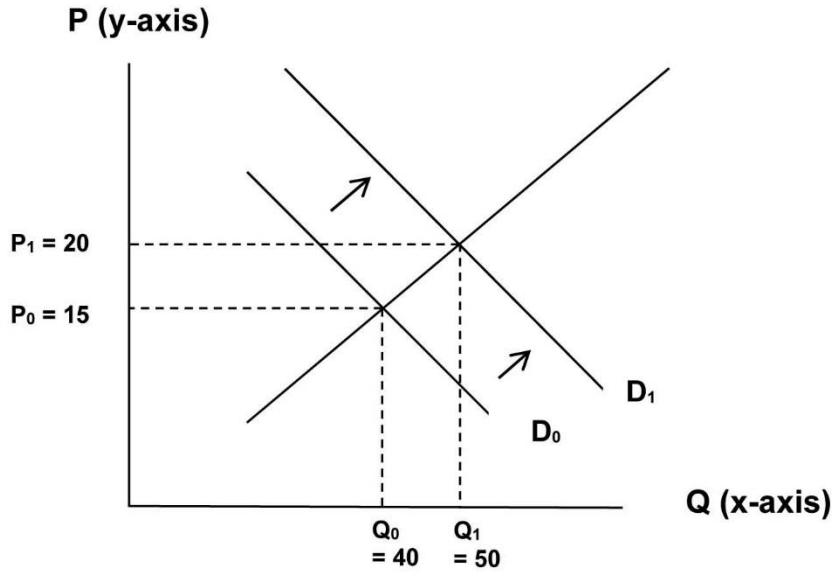
number of units that suppliers would like to sell at that price but are unable to; the upper line in the graph below represents the price floor and helps identify the various quantities).

For example, a minimum wage for unskilled workers results in higher unemployment rates for unskilled workers.

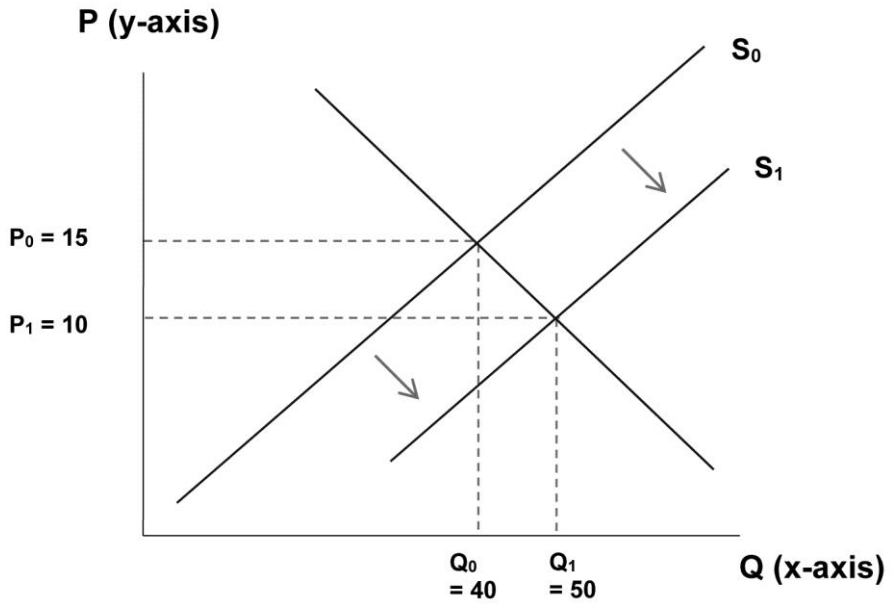


Shifts in demand and supply lead to somewhat predictable changes from an initial combination of equilibrium price and equilibrium quantity to a new combination:

Comparing an Initial and a New Equilibrium Resulting from an Increase in Demand



Comparing an Initial and a New Equilibrium Resulting from an Increase in Supply



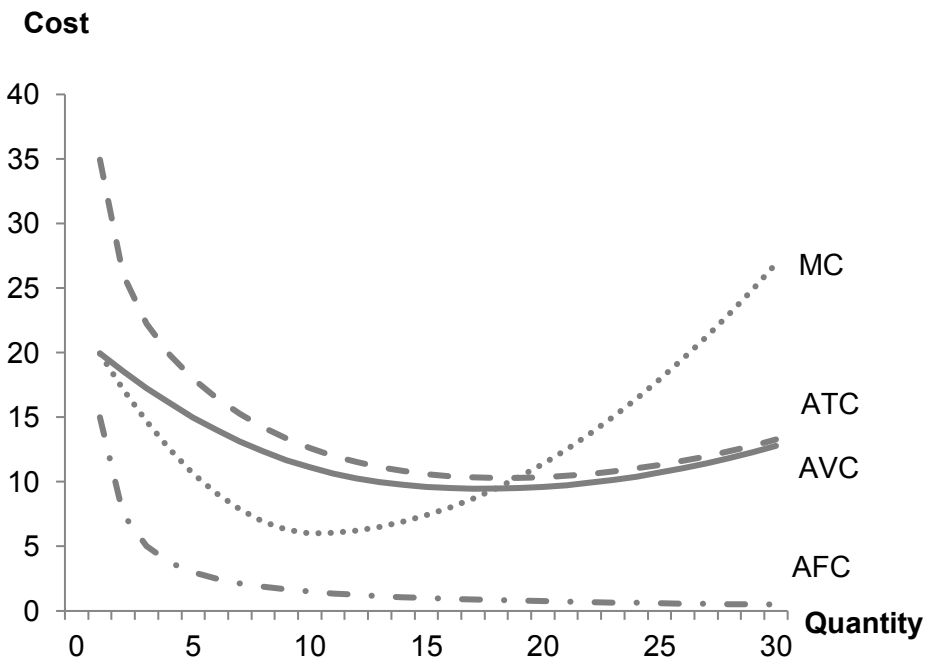
Below we summarize the changes in equilibrium price and quantity resulting from various shifts in supply and demand curves:

Demand	Supply	Equilibrium Price	Quantity Purchased
Increase	No change	Increase	Increase
Decrease	No change	Decrease	Decrease
No change	Increase	Decrease	Increase
No change	Decrease	Increase	Decrease
Increase	Increase	**Uncertain**	Increase
Decrease	Decrease	**Uncertain**	Decrease
Increase	Decrease	Increase	**Uncertain**
Decrease	Increase	Decrease	**Uncertain**

Lecture 1.06 – Production Costs

Over short periods of time and limited ranges of production, firms have costs that include both fixed and variable components:

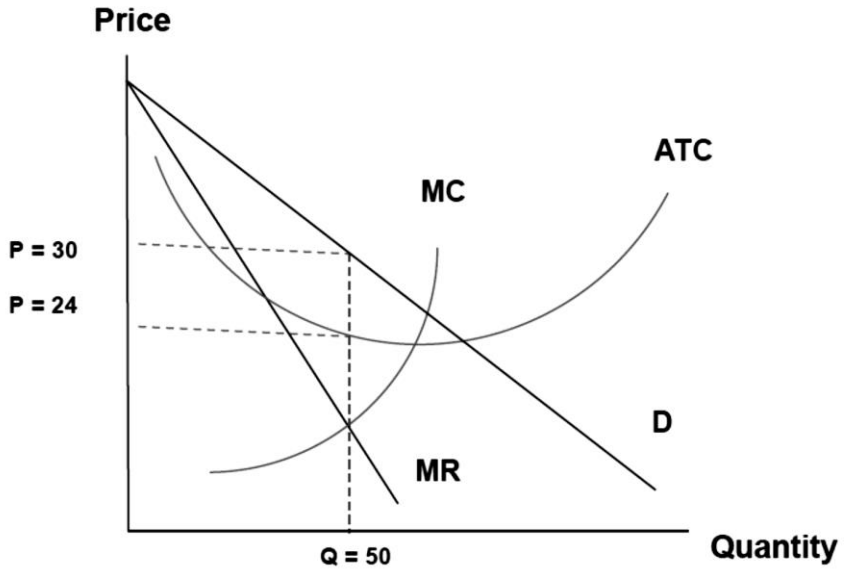
- **Fixed costs (FC)** – Costs that won't change even when there is a change in the level of production. *Average fixed costs* (AFC) are total fixed costs divided by the number of units produced. An example of a fixed cost is rent paid on the production facility.
- **Variable costs (VC)** – Costs that rise as production rises. *Average variable costs* (AVC) are total variable costs divided by the number of units produced. An example is materials used in the manufacture of the product. The boundary between fixed and variable costs of course depends on the length of period under consideration. Over a period that is short enough, one might consider the payments to hourly workers as a variable cost (i.e., the number of hours are readily adjusted) and the payment to salaried workers as a fixed cost (i.e., most companies will not change the number of salaried workers in the very short term).
- **Total costs (TC)** – The sum of fixed and variable costs (TC = FC + VC). *Average total costs* (ATC) are total costs divided by the number of units produced.
- **Marginal cost (MC)** – The increase in cost that results from producing one extra unit. Only variable costs are relevant, since fixed costs won't increase in such circumstances. Any set of production arrangements will be most ideal for a given production level, thus marginal cost falls until some level is attained (e.g., different parts of a large factory may be too far apart from one another if production is small) and then rise after some level is attained (e.g., a factory of a given size will eventually become overcrowded if more and more workers are there). Note that for the first unit, MC = VC = AVC.
- **Marginal Revenue (MR)** - The change in total revenue (TR) associated with the sale of one more unit of output.
- **Marginal Revenue Product** - The increase in total revenue received by the addition of one additional unit of an input or resource (e.g., one more worker).



To maximize profits, managers would choose levels of production (output or quantity) such that their company's marginal revenue equals their marginal cost. If the marginal revenue of producing one extra unit exceeds its marginal cost, it is profitable to increase production. Facing a downward sloping demand curve, to increase their sales, firms must accept lower prices (and marginal revenues). Once the marginal revenue equals marginal cost, managers will have attained the level of production that maximizes profits in the short term. Increasing production further would result in marginal revenues falling short of marginal costs.

For example, a company operating below capacity can sell units at a profit for any price in excess of VC. Once capacity is reached, however, the production of one additional unit will also increase total fixed costs and the increase in revenue from the sale of a single unit would be lower than the increase in TC.

In the following graph, MR = MC for a quantity of 50. The total cost (TC) is \$1,200 (= ATC × Q = \$24 × 50). The firm would set the price at the maximum possible level given the demand curve (= 30), not at the marginal revenue (of about 12). Total revenue (TR) is \$1,500 (= P × Q = \$30 × 50). Profit is \$300 (= TR – TC = \$1,500 – \$1,200). Note that the profit maximizing quantity does not involve the minimum level of ATC (i.e., where MC crosses ATC), but (in this graph a slightly) higher level (= 24).



In economic analysis, over periods of time that are long enough, all costs are *variable*, since firms may change how much they use of any input (hire more or fewer hourly or salaried workers, expand factories, build additional factories, etc.). In the long run, i.e., even if a firm may adjust its level of usage of all inputs (e.g., expand or redesign factories, or build new ones), it may find that increases in production may reduce, have no effect on, or increase their per unit (or average) costs. Note that in the long run, by definition there are no fixed costs and thus variable cost equals total cost.

Returns to scale are the increases in units produced (output) that result from increases in production costs (i.e., costs of inputs).

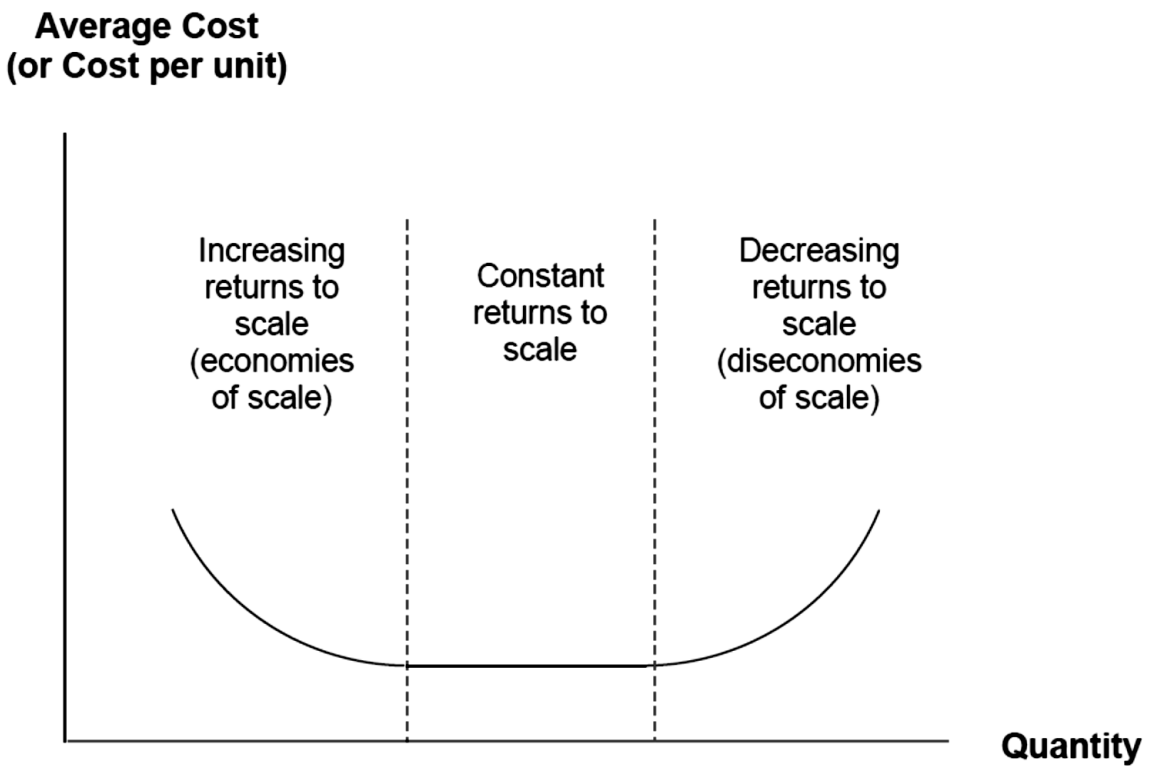
$$\textbf{\textit{Returns to scale}} = \frac{\textit{Percentage increase in } \textbf{\textit{output}}}{\textit{Percentage increase in } \textbf{\textit{input}}}$$

At lower levels of production (and of use of inputs), many firms face returns to scale greater than 1, or **increasing returns to scale**. Alternatively, these firms may be described as facing **economies of scale**, or increased efficiencies from producing more units of a product. This may result from spreading fixed costs over larger numbers of units, being able to save on transaction and transportation costs by buying in larger quantities, having employees specialize in different tasks and improve their abilities, or automatic procedures that are performed repetitively. Thus, in the long run, firms that increase their size by some amount may experience increasing returns, operate more efficiently, and lower their average costs.

However, ever larger levels of production (and of use of inputs) may eventually result in returns to scale smaller than 1, or **decreasing returns to scale.** These firms may be described as facing **diseconomies of scale**, or increased inefficiencies. This may result from increasing volumes of inventory stored, making retrieval more difficult; increasing the number of employees working, making effective supervision more difficult; or hiring lower skilled workers, resulting in more errors and a lower product acceptance rate.

Between increasing and decreasing returns to scale (and economies and diseconomies of scale), firms may operate in ranges of levels of production (and of use of inputs) where they face constant returns to scale. Over this range, increasing production would not affect their average costs.

Firms should not increase production beyond levels at which marginal revenue from output exceeds marginal costs from inputs.



- **Increasing returns to scale**—Output increases by a greater proportion > 1.0
- **Constant returns to scale**—Output increases in same proportion = 1.0
- **Decreasing returns to scale**—Output increases by a smaller proportion < 1.0

Using some mathematical examples:

- **Increasing returns to scale**– Range of output for which increases in the use of inputs (e.g., from 20 to 30 and 40, both increases of 10 units) yield more than proportionate increases in output (i.e., from 100 to 200 and 320, or increases of 100 and 120). Alternatively, this concept means that increasing output (e.g., from 100 to 200 and 320), involves falling per unit costs (i.e., respectively 0.2, 0.15, and 0.125)
- **Constant returns to scale** Range of output for which increases in the use of inputs (e.g., from 50 to 60 and 70, both increases of 10 units) yield proportionate increases in output (from 550 to 660 and 770, or increases of 110). Alternatively, this concept means that increasing output (e.g., from 550 to 660 and 770) involves constant per unit costs (i.e., all 0.091).
- **Decreasing returns to scale** Range of output for which increases in the use of inputs (e.g., from 100 to 110 and 120, both increases of 10 units) yield less than proportionate increases in output (i.e., from 1,100 to 1,190 and 1,270, or increases of 90 and 80). Alternatively, this concept means that increasing output (e.g., from 1,100 to 1,190 and 1,270) involves rising per unit costs (i.e., respectively 0.091, 0.092, and 0.094).

Lecture 1.07 – Market Structure & Industry Analysis

Economics defines an industry as a group of firms that produce products or services that consumers would identify as similar enough to be considered substitutes. To better understand how firms and industries may operate, economists have developed several key models (i.e., simplifications of reality) of market structures that illustrate varying levels of competition. Ranging from most to least competitive, these models are perfect competition, monopolistic competition, oligopoly (or oligopolistic competition), and pure monopoly.

Perfect (or Pure) Competition

While few, if any, industries or markets may actually be perfectly competitive, having a model of perfect competition is useful in terms of assessing how close or far various industries may come to being perfectly competitive. Perfect competition would involve a situation with large numbers of sellers, where each individual seller is too small to affect the overall market price, easy entry and exit of suppliers (no barriers to entry/exit), a homogeneous (standardized or identical) product, and an absence of non-price competition (such as advertising and perceived quality differences).

Some commodities markets (wheat, soybeans, corn, etc.) are commonly mentioned as coming closest to being perfectly competitive. In a perfectly competitive market, an individual firm effectively faces a horizontal demand curve and prices are perfectly elastic: The firm can sell as many goods as it can produce at the equilibrium price but no goods at a higher price. In other words, the firm is a *price taker*. Thus, for the individual firm, the equilibrium market price is its marginal revenue curve for all production levels. The individual firm faces an incentive to expand quantity produced until its marginal costs rise to equal the equilibrium market price (which is the firm's marginal revenue curve).

While each individual firm alone has no effect on the overall market price and the demand curve for each individual firm is horizontal, the *market demand curve* is downward sloping. Therefore, quantity demanded increases if entry of more suppliers lowers prices and quantity demanded decreases if exit by some suppliers raises prices. If the equilibrium market price is high enough that individual firms earn economic profits, large numbers of new suppliers will enter the market, lowering prices until firms earn only normal profits (i.e., an economic profit of zero). If the equilibrium market price is so low that individual firms incur economic losses, large numbers of the most marginal (i.e., least efficient) suppliers will exit the market, lifting prices until the remaining firms earn normal profits.

To recap, an industry would be *perfectly competitive* if it met the following conditions:

- It includes a large number of sellers, each of which is too small to affect the overall market price.
- All firms sell a homogeneous (i.e., largely identical) product (e.g., wheat, soybeans, corn, etc.).
- There is no non-price competition (e.g., no advertising).
- Firms may enter or exit the market very easily (i.e., there are no significant barriers to entry, ceilings or floors).
- Each individual firm faces a demand curve that is perfectly elastic (horizontal).

Pure Monopoly

In this model, there is only one firm that sells a product or service for which there are no close substitutes. Monopolies may exist as a result of public policy or of "technical" conditions. Common examples of monopolies resulting from public policy include the local monopolies that cable companies operate in most areas or the national monopolies that each drug manufacturer has for each given product for which it has a **patent**, which ultimately is a *barrier to entry*.

For markets where there is no relevant range of output, where decreasing returns to scale set in, **natural monopolies** may exist as economies of scale would permit the largest firm to underprice, and eliminate, all others. Companies with lower costs may seek to engage in **predatory pricing**, charging temporarily low prices to drive their competitors out of existence, only to increase their prices as monopolists once they have eliminated their competitors. Unless restricted by regulation, a pure monopoly would have great pricing power and, producing only to the level where marginal revenue equals marginal costs, would result in economic profits (earnings higher than normal profits), with substantially higher prices and lower output than under more competitive market structures in both the short and long runs.

Various laws have been passed to reduce anticompetitive market practices, including:

- **The Sherman Act** (1890) prohibited price fixing, boycotts, market division, and restricted resale agreements among suppliers.
- **The Clayton Act** (1914) prohibited stock mergers that reduce competition, price discrimination, and common directorships among competing firms.
- **The Robinson-Patman Act** (1936) prohibited discounts to large purchasers not based on cost differentials.
- **The Celler-Kefauver Act** (1950) prohibits acquisition of the assets of a competitor if it would reduce competition.

To recap, an industry would be a *pure monopoly* if it met the following conditions:

- There is only one producer.
- No close substitutes are available.
- There is blocked entry (patent or Government franchise-public utility).
- The firm's Demand curve is substantially downward sloping (almost vertical).

Monopolistic Competition

In this model, large numbers of firms produce heterogeneous products and engage in a great deal of non-price competition. Entry and exit are relatively easy, but not as easy as under perfect competition. The products offered by different firms are close substitutes, but not identical. Examples might include mom-and-pop restaurants, groceries, hair dressers, etc. Firms' efforts to differentiate their products in the minds of their customers give firms some control over prices (i.e., individual firms' demand curves and the marginal revenue curves are not completely horizontal as in perfect competition, but are slightly or somewhat downward slopping). Thus, as firms produce to the point where marginal revenue equals marginal costs, this model yields prices that are somewhat higher and quantities that are somewhat lower than under perfect competition. In this model, however, easy entry and exit generally tends to eliminate large economic profits. Thus, prices are generally substantially lower and quantities substantially higher than in pure monopoly situations. Again, products and services under monopolistic competition tend to be priced somewhat higher than in a perfectly competitive market, but substantially lower than in a pure monopoly.

To recap, an industry would be *monopolistically competitive* if it met the following conditions:

- It includes a large number of sellers.
- Firms sell heterogeneous products.
- There is lots of non-price competition (advertising, products with slightly differing features, actual quality differences).
- It is relatively easy to enter and exit the market.
- Each individual firm faces a demand curve that is slightly or somewhat downward sloping.

Some customers may be willing to pay higher prices than others. **Price discrimination** works most effectively when consumers are split into distinct segments. For example, consumers buying prestige shampoo for humans generally are willing to pay more than consumers buying shampoo for horses—even if the formula is the same; with different packaging, the producer may charge more to purchasers intending to use the shampoo on humans. A seller may contrive segmentation where none naturally exists, with coupons or early bird sales. For instance, a seller may give significant discounts to the first 100 shoppers on the day after the Thanksgiving holidays or small discounts to buyers with coupons placed in strategically chosen periodicals.

Oligopoly (or Oligopolistic Competition)

In this type of market structure, significant barriers to entry ensure that there are only a small number of (typically large) firms. Barriers to entry may result from a variety of reasons: Developing new products or factories may be very costly or involve substantial lags from development to sales (e.g., automobiles and aerospace) or setting up the infrastructure to service large numbers of customers may be costly (e.g., car dealerships). In some cases, government licensing effectively creates oligopolies (e.g., cell companies, etc.). In oligopolistic competition, products may be homogeneous (such as a given grade of oil) or heterogeneous (such as the airline manufacturing market). In oligopolistic markets, since there are few competitors, the actions by one firm are likely to affect the decisions of other firms (**game theory**), and the market as a whole.

Because the actions of rivals cannot be easily predicted in such a strategic setting, there is not a single model that describes well all markets with few firms. In some cases, a company's decision to gain market share by lowering its prices may result in other companies matching its pricing (i.e., there would be a **price war** and market shares might not change appreciably). Thus, oligopolistic firms often attempt to engage in non-price competition (by product differentiation or providing high levels of service). In other oligopolistic markets, a small number of smaller firms simply base their pricing on that of a larger firm that acts as a pricing leader.

Governments seek to regulate oligopolistic competition variously, for instance, by forbidding formal quantity agreements among competitors, known as **cartels** and price fixing (or collusive pricing). A concentration ratio is a measure of the total output of an industry by a certain number of firms in that industry, such as the 4 or 8 largest. The Herfindahl index (concentration ratio) is a measure of the size of firms within an industry. These measures indicate the degree to which an industry is oligopolistic. Under oligopolistic competition, products and services tend to be priced substantially higher than under monopolistic competition, since barriers to entry cause economic profits to remain, but pricing is typically somewhat lower than under pure monopoly.

To recap, an industry would be *an Oligopoly* if it met the following conditions:

- A small number of large sellers
- Barriers to entry (cost or patents)
- Non-price competition exists.
- Rival actions are observed.
- The firm's Demand curve is Kinked.

Industry Analysis

To analyze their industry, firms may use **competitor analysis** to understand and predict the behavior of a major competitor. The two components of competitor analysis are collecting information and using that information to understand, predict and respond to that competitor. Firms must also analyze their **target market,** which involves determining who their customers are and why they are purchasing their products.

Strategic planning involves organizations' efforts to identify their long-term goals and to determine how best to reach those goals. To develop **business strategies**, managers commonly engage in formal analyses of their ***s****trengths,* ***w****eaknesses,* ***o****pportunities, and* ***t****hreats* (i.e., **SWOT** analyses).

Formal strategic planning typically involves several steps. A typical first step involves creating (or updating) an organization's **mission statement**, which outlines the long-term purposes of an organization. The purposes of different organizations vary across the different types of organizations, ranging, for instance, from for-profit, family, mutual or cooperative, government, or charitable organizations (e.g., delivering profits to owners, delivering a quality product to consumers, serving unmet needs of specific groups, etc.). Some organizations create a values statement first, from which the mission statement flows.

After the organization has a mission statement, it may set its **goals and objectives**. The boundary between goals and objectives is definitional and different organizations may use different terms but, in general, goals are expressed in general terms (e.g., deliver good returns to investors) and objectives (often several objectives per goal) set specific targets (e.g., increase ROE from 15% to 20% within 5 years).

Next, organizations determine what **actions** should be taken to meet their goals and objectives and establish mechanisms to collect data to be able to engage in **assessment** of whether the goals and objectives were met. Once data has been collected, organizations review whether their actions were successful and restart the cycle, perhaps revising strategic plans, but specifically using the data and assessment results to develop new action plans.

To successfully implement their strategies, firms must ensure that formal strategies are not simply developed by an ad hoc committee and then not implemented, but rather that management is on board with the development and implementation of its business strategies. **Business strategies** are commonly classified as product differentiation or cost leadership strategies.

- **Product differentiation strategies** involve developing a range of slightly different products that are more attractive to one's target markets or simply to ensure that they differ substantially from competitors' offerings. This strategy will (1) make the firm's sales less responsive to changes in the prices charged by other competitors, (2) allow the firm to charge different prices (i.e., some higher) for different products, and (3) ultimately allow the

firm to charge higher prices than otherwise (and potentially higher than those of one's competitors). Products may differ in many ways:

- *Physical differences* – individual features, quality, appearance
- *Perceived differences* – image, brand name, advertising
- *Customer support differences* – return policies, technical support

- **Cost leadership strategies** concentrate on *cutting the costs* of producing, selling, and distributing a firm's range of products. These strategies include:
  - *Process reengineering* – In-depth redesigns of firms' existing processes to improve performance.
  - *Lean manufacturing* – Identifying and removing the misuse of resources in the firms' existing production processes.
  - *Supply chain management* – Sharing relevant information in the chain of sales that ranges from the final consumer to the various levels of suppliers, independently of whether each step took place within one's firm or not. For example, all steps of the chain, from retailers to wholesalers to suppliers and supplier's suppliers, might be able to operate with leaner inventories overall if each party shared more readily its plans and forecasts.

Lecture 1.09 – Macroeconomics

Macroeconomics is the study of the economy as a whole. Key concerns in macroeconomics include unemployment, inflation, and long-term economic growth. Other subsidiary concerns in macroeconomics include lending growth, interest rates, exchange rates, the trade balance, and government budget deficits and debts. Macroeconomics studies the roles of households (consumers), (nonfinancial) businesses, governments, the financial sector, and foreign economies in causing and/or alleviating undesired fluctuations in domestic economic conditions. ***Economic systems*** may generally be classified as one of three broad categories:

- **Capitalism,** also known as *free enterprise*, refers to a system where private parties (i.e., non-government ones) own most of the means of production and make most economic decisions (i.e., what and how much to produce, at what prices, and given their incomes and available prices, what and how much to consume).
- **Communism (or socialism)** refers to a system where *government entities own* most of the means of production and make most economic decisions.
- **Mixed economies** refers to the "in between" systems where both private parties and governments own substantial fractions of the means of production and make substantial fractions of economic decisions. Historically, virtually all countries, including the United States, have combined some elements of private and government ownership of the means of production and private and government economic decision making. Governments may, for instance, influence economic decision making through taxes (including tariffs on trade) that favor or disfavor certain activities, through their spending of tax revenues, and through regulatory policies that encourage or discourage various activities.

Some of the most important *measures and indicators of economic conditions* (i.e., benchmarks to measure economic activity) are gross domestic product (GDP, also known as nominal GDP), real GDP, gross national product (GNP), inflation, and aggregate supply and demand.

Gross Domestic Product (GDP)

The total dollar value, at current (or nominal) market prices, of all the "final" goods and services produced within ***one country's borders*** (regardless of the citizenship of the individual residents or the country of headquarters of the companies involved) during a period of time (typically a year). The word "final" refers to the fact that GDP aims to avoid double counting of inputs used in the production of other products. For instance, if a farmer reports sales of flour to a baker, and a baker uses that flour to make bread, and reports sales of bread to "final" consumers, the original sale of flour is not considered a final sale (to a consumer). Thus, the production of that flour is included in GDP in as much as it is included in the price of bread, but not simply by adding total sales of flour plus total sales of bread).

GDP may be computed using either of two theoretically-equivalent approaches:

- *The income approach* sums all income earned in the production of final goods and services, such as wages, interest, rents, business profits, plus adjustments for indirect taxes and economic depreciation (expenditures to replace physical equipment that wears out).
- *The expenditure approach* sums all expenditures to purchase final goods and services by households (personal consumption expenditures), businesses (gross private investment, e.g., machinery), the government, and the foreign sector (exports), minus adjustments for expenditures produced abroad (imports).

Real GDP

Real GDP is the total dollar value of all the final goods and services produced expressed using a price level that is constant (chained) over time. Nominal GDP is adjusted to yield Real GDP by removing the effects of increases in prices (i.e., inflation) from the sum of total purchases of goods and services (i.e., to focus on the changes in units sold, not on the changes in prices).

Real GDP (often simply referred to as GDP, economic production, or output) is the most commonly used and most comprehensive measure of economic production. Comparing economic size or levels of development across countries, economists commonly compare respectively total GDP for a country or GDP per capita. Assessing an individual country's progress, economists commonly focus on annual rates of percentage change in real GDP.

Economists use a variety of terms and concepts that imply that there is a "sort of" speed limit for economic growth that economies may sustainably attain, but should be careful to not to exceed. Thus, aside from the "actual" nominal and real GDP, the Congressional Budget Office (CBO) also computes **potential GDP** (in nominal and real versions), that helps to estimate the degree to which the economy is either underutilizing resources or "overheating." If, for instance, actual real GDP falls short of potential real GDP, resources will be underused (unemployment rates will be higher). If actual real GDP exceeds potential real GDP, the economy will be overheating (resulting in unsustainably low unemployment rates, boom conditions in various markets, and eventually price inflation). Concepts similar to potential GDP are the "natural" or **"non-accelerating-inflation" rate of unemployment (NAIRU),** where if the actual unemployment rate falls below NAIRU, boom conditions follow in the short term and problems such as higher inflation eventually follow.

A key problem in macroeconomic management is that the negative consequences of exceeding these speeds limits take place with **long and variable lags**, i.e., it may take several years before there is clear evidence of a problem. Economists "joke" that macroeconomic policymaking is similar to driving a car being able to use only one's rearview mirrors.

Gross National Product (GNP)

Gross National Product (GNP) is the total dollar value of all goods and services produced by a country's ***residents*** (including companies headquartered there) regardless of whether they were produced within or outside that country's borders. While both GNP and GDP are computed routinely, the U.S. government emphasized GNP until 1991, when it switched to emphasize GDP, to match common practice in most other countries. GNP differs from GDP in that GNP includes, for instance, earnings of U.S. companies abroad, and excludes earnings of foreign companies within the U.S.

Inflation

Inflation is commonly defined as the percentage rate of increase in the price level of goods and services. Rising inflation means that individuals can purchase less either if they are on fixed incomes or with their past savings. Stating that inflation is higher is equivalent to stating that money is losing its purchasing power at a higher rate. From the point of view of financial statements, inflation tends to affect most accounting measures that take place over extended periods of time (e.g., assets and depreciation entered using historic or book values) and affects relatively fewer accounting measures that compare factors that take place within the last time period. For example, higher inflation may affect all of revenues (prices), costs (wages and interest), and resulting earnings more simultaneously.

Protecting oneself against inflation effectively is difficult. The price of some assets (e.g., commodities, **precious metals** such as gold, and real estate) tend to outpace overall consumer inflation (i.e., provided a hedge) during some periods when inflation is climbing or expected to climb. However, those same assets may fall in price when the risk of inflation subdues. Thus, while precious metals may provide protection over short periods of climbing inflation, over the long term, common stocks, for instance, have delivered far higher returns. Companies' costs and sales and workers' wages often increase in line with inflation for many (growing) sectors of the economy, but fail to do so for other sectors with worse long-term prospects. While some parties include inflation adjustments in contracts (e.g., **cost of living adjustment clauses**), such clauses remain relatively rare in the U.S. Also, while such clauses may benefit one party, they may be costly and ultimately shift the risk to a counterparty. The U.S. government started to sell Treasury Inflation-indexed Securities (commonly abbreviated as TIPS since the securities once included the word "protected" instead of "indexed") in 1997. As an example of how protecting against inflation is costly, these securities provide larger payouts if the CPI increases, but if inflation turns out to be low, as in the early 2010's, buyers may receive negative nominal returns.

Inflation is most commonly reported on an annual or year-on-year basis (e.g., comparing the price level in a given month, say April of 1995, to the price level in the same month in the previous year, i.e., April of 1994). **Hyperinflation** is similar to inflation, except that the value of the currency is decreased at a much faster rate, so prices increase much more rapidly.

Deflation is a term describing a general decline in the price level (i.e., not a decline in the prices of just a few goods) or a negative inflation rate. Periods of weak economic growth are sometimes (like the 1930's in the U.S., Japan in recent decades, and part of the recent U.S. financial crisis) accompanied by bouts of very low inflation or outright deflation, and by low nominal interest rates. Many economists argue that deflation can damage the economy as businesses may not want to take loans when they are uncertain about how well the economy will perform (i.e., will sales justify the loan?) and about whether the purchasing power of the principal of their loan will actually have increased. The solution for deflation (that is most commonly cited and that is most theoretically accepted) is *to increase the money supply.* However, the experience of Japan since the mid-1990's shows that ending long periods of deflation may be easier in theory than in practice.

There are three common measures of price inflation:

- **The Consumer price index (CPI)** compares the price of a fixed basket of goods and services that a typical urban consumer might purchase in an earlier base period (e.g., 100 in 1982-84) and the price of the same basket of goods and services at later times. The CPI is commonly used to convert "nominal" figures that are not readily comparable across years into "real" figures that use the same level of prices and are therefore more comparable. Consider, for instance, one worker who earned (and for simplicity spent) $40,000 in 2002 when the CPI was 180 and the same worker who earned (and spent) $50,000 in 2012 when the CPI was 230. Converting the $40,000 from 2002 into 2012 dollars (or prices), one finds that the income in 2002 purchased the equivalent of $51,111 in 2012 (= $40,000 × 230 / 180); so, in this example the workers' real income actually fell by 2.2% during this period.

- **The Producer price index (PPI)** compares the price of a fixed basket of goods, inputs, and materials purchased by producers at the wholesale level, instead of focusing on the prices paid at the retail level by consumers.

- **The GDP deflator** is the most comprehensive measure of price levels, including prices paid by all parties included in GDP instead of only consumers. The GDP deflator is the index used to convert nominal GDP into real GDP.

Aggregate Demand and Supply

Just as there are demand and supply curves for individual products, some economists find it helpful to use aggregate demand and supply curves for the overall levels of prices and production of goods and services of an entire economy. An ***Aggregate Demand Curve*** seeks to represent the relationship between (1) total expenditures by consumers, businesses, government, and the foreign sector and (2) the price level, at a given point of time.

The *aggregate demand curve* may slope downward for several reasons:

- **Interest rate effect –** Higher inflation rates increase nominal interest rates and may decrease consumer borrowing, reducing the quantity demanded (negative shift in the demand curve) of items whose purchase is typically financed, such as houses and automobiles.
- **Wealth effect –** Higher inflation rates reduce the value of most fixed income investments (such as conventional bonds). Having less wealth, individuals may consume less.
- **International purchasing power effect –** Domestic inflation makes domestic goods and services more expensive relative to foreign goods and services, increasing the quantity demanded of foreign products and decreasing the quantity demanded (negative shift in the demand curve) of domestic goods and services.

An **Aggregate Supply Curve** seeks to represent the relationship between (1) total goods and services produced (production, output, or quantity) and (2) the price level, at a given point of time. Economists don't often agree on the precise shape of the supply curve, but for the purposes of the CPA exam, we will simply assume that it is generally upward sloping, as shown in the two examples below.

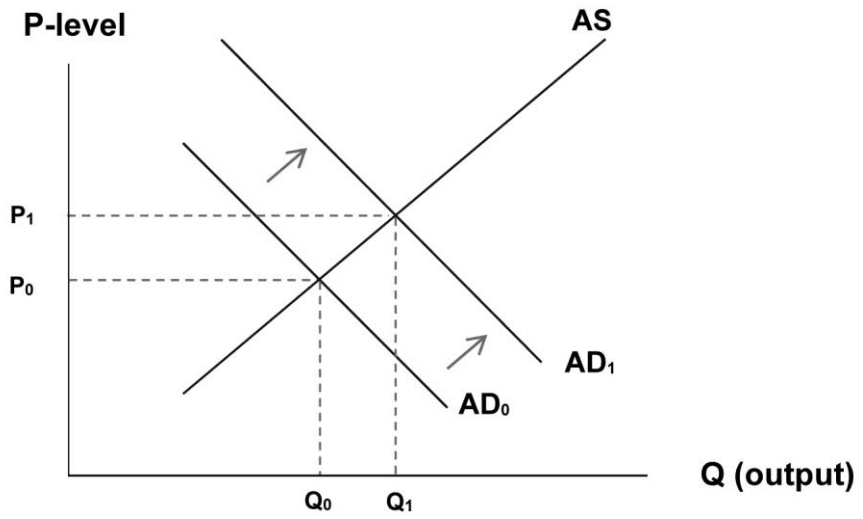
Just like in the market for a single product, the aggregate demand and aggregate supply curves may also shift. A "first-pass" simplified macroeconomic model focuses on shifts in the aggregate demand, increasing or decreasing depending, for instance, on consumer, business, and foreign sector confidence about the future, and countercyclical policy by the government. The standard assumption is that looser fiscal policy (i.e., larger government budget deficits) and looser monetary policy (i.e., lower interest rates) increase aggregate demand. It is also assumed that the opposite is true with tighter fiscal policy and tighter monetary policy decreasing aggregate demand. We review fiscal and monetary policy and their commonly expected effects in more detail further below.

We may use the aggregate supply, aggregate demand framework to illustrate two possible causes of inflation.

Demand-Pull Inflation (i.e., the demand curve shifted upward)

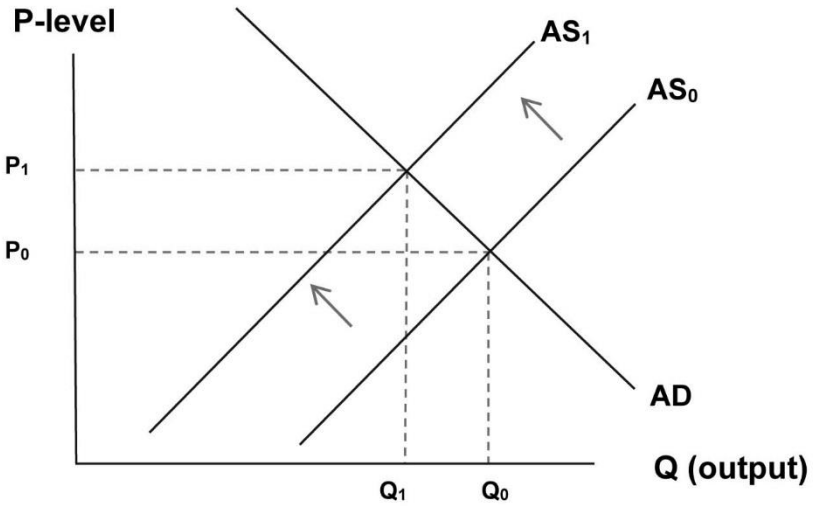
When aggregate spending increases, the **demand** curve moves to the **right**, causing the market equilibrium to occur at higher price levels (see graph below). Excess demand bids up the cost of labor and other resources. Excess demand may be a result, for instance, of improved expectations by consumers or businesses, of the foreign sector, or from government fiscal and monetary policy that turned out to be too loose.

Notice that, according to this simplified model, the equilibrium point occurs at higher levels of both prices AND quantity. Economists have historically found that in the short term (i.e., less than a few years), there is a trade-off between inflation and unemployment. We often observe that when economies are growing quickly and unemployment rates fall particularly low (e.g., below NAIRU), wages, company costs, and consumer inflation rates rise more quickly. Conversely, when economies are not growing as fast and unemployment rates are higher (above NAIRU), wages, company costs, and consumer inflation rates rise less quickly, if at all. This short-term tradeoff between inflation and unemployment is known as the short-term **Phillips Curve**. However, this tradeoff holds only in the short term. In the long term (i.e., after a few years), unemployment rates rise back to NAIRU. Thus, in a graph (not shown here) where inflation is in the y-axis and unemployment in the x-axis, the long-term Phillips Curve is said to be vertical: policies that seek to reduce unemployment below NAIRU may seem to succeed in the short term, but do not yield sustainable reductions in unemployment, but increases in inflation.



Cost-Push Inflation (i.e., the supply curve shifted inward)

If producers (or suppliers) within one country face increases in the costs of using some inputs (e.g., commodities such as oil), the **aggregate supply** curve would shift to the **left**, causing the market equilibrium to occur at a higher price level and at a lower quantity. Since the prices of many production inputs are set in international markets, individual countries may experience changes in those input costs that are not directly, or strictly, related to economic conditions within that country. Many observers argue that such a "**negative supply shock**" played a key role in the **stagflation** that affected the U.S. during the 1970's. Stagflation is a term that combines the words "stagnation" and "inflation," but it is generally used to describe periods of high inflation and high unemployment.


P-level
AS1
AS0
P1
P0
AD
Q (output)
Q1
Q0

Lecture 1.12 – Business Cycles

Business cycles are fluctuations in economic production (output) typically lasting several years. Some business cycles have been shorter (barely a couple of years) and others longer (over one decade). Some business cycles are deep, involving large fluctuations (like the recession surrounding the financial crisis of 2008) and others relatively shallower (like the recession in 2001 following the dot.com bust). By convention, each business cycle includes one recession (or contraction) and one expansion. Each recession begins at the peak (or maximum level of output) from the previous expansion and ends at its trough (or minimum level of output for the recession). Each expansion begins at the trough of the previous recession and ends at the next peak.

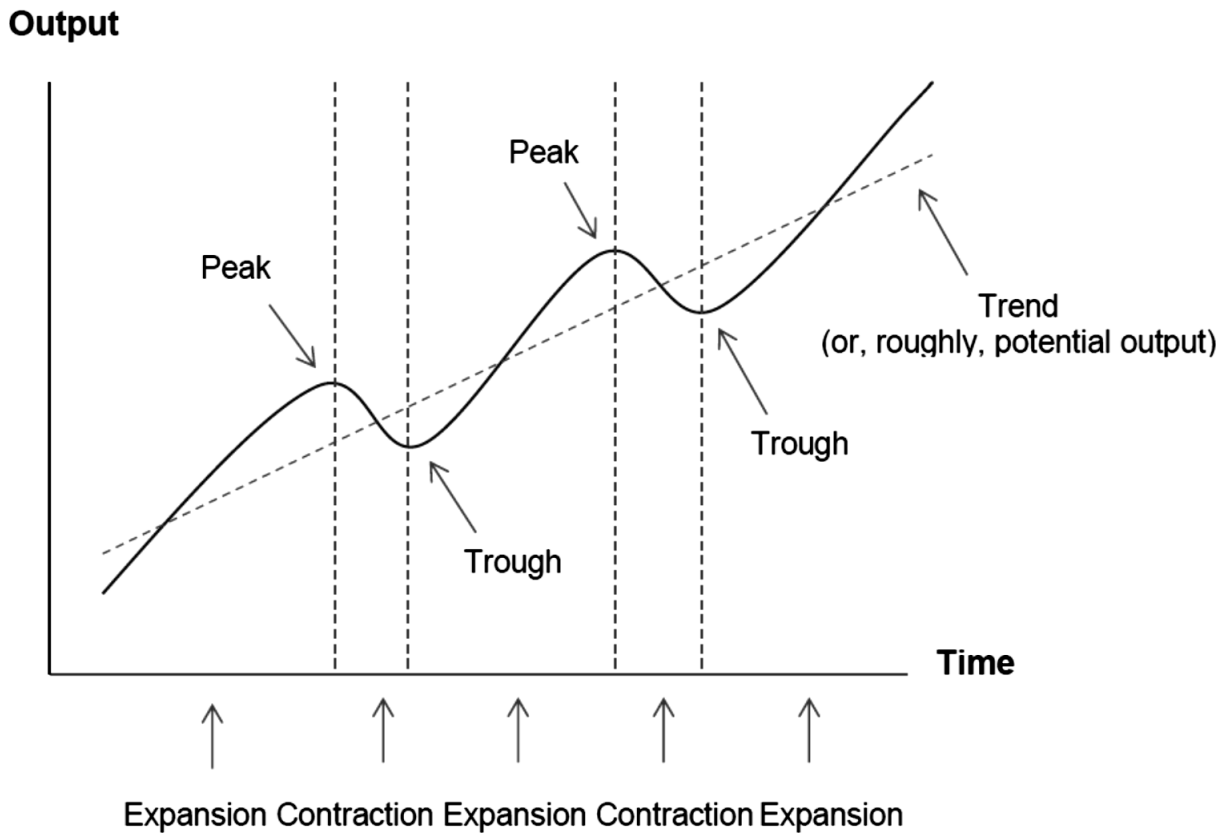
The early stages of expansions are called recoveries. Recoveries are commonly described as having become full expansions when the previous peak is passed. Over the long term, nearly all measures of economic activity and personal well-being have grown or improved enormously in virtually every capitalist economy. However, growth has not taken place at a steady pace, but typically alternates between longer periods of strong growth and shorter periods of decline.

Terms used in connection with the business cycle include:

- **Expansion –** Typically extended period (i.e., several years) of increased economic production. The early stages of many expansions (i.e., recoveries) during the second half of the twentieth century were marked by fast declines in unemployment rates. However, declines in unemployment have grown increasingly slower (i.e., so-called **jobless recoveries**) following each of the last three recessions (i.e., those of 1990-1991, 2001, and 2007-2009). The final stages of many expansions during the twentieth century were marked by booming economic conditions, including GDP above potential and higher rates of inflation. Increased spending will cause a positive shift in the demand curve to the right (higher equilibrium GDP). Technological advances will also cause a positive shift in the supply curve, also resulting in a higher equilibrium GDP.
- **Recession (or Contraction) –** Typically briefer periods (i.e., several months or only a few years) of decreased economic production. Formally, the business cycle dating committee of the National Bureau of Economic Research (NBER, technically a non-profit) determines the beginning and end of recessions and expansions based on a variety of parameters. As a rule of thumb, economists describe recessions as periods of at least two consecutive quarters of negative growth in real GDP. During the twentieth century, **many recessions followed efforts by the Federal Reserve (see section below on monetary policy) to restrain higher inflation rates through increases in interest rates**. The declines in economic production during recessions are accompanied by declines in employment and increases in unemployment rates (Okun's law provides a commonly-mentioned rule of thumb relating declines in GDP and increases in unemployment). At the end of recessions, GDP is well below potential. Periods of decreased aggregate spending will shift the demand curve to the left and result in a lower equilibrium GDP. Trade wars cause a negative shift in the supply curve and also cause a decline in GDP.
- **Depression –** A recession that is either particularly deep or long lasting. There is no formal agreement as to the boundary between recession and depression. For perspective, the Great Depression of 1929-1933 involved declines in real GDP of 27% and increases in unemployment rates from 3.2% to 25.2%. Since unemployment rates had declined only to 9.9% by 1941, the Great Depression is often dated as having spanned 1929-1941. In contrast, the recent Great Recession was the deepest recession since World War II and

involved declines in real GDP of 4.7% and increases in unemployment rates from 4.7% to 10.1%.

- **Recovery –** The early stages of an expansion, commonly thought to become a full expansion when the peak from the previous expansion is passed.



Economists track many indicators to gauge, evaluate, and predict current and future economic conditions. These indicators may be classified into three broad categories:

- **Leading Indicators –** seek to predict whether expansions (or recessions) are likely to end within the next few months. Economists have experimented with many indicators for these purposes, but their effectiveness, of course, varies across business cycles. Some commonly-used leading indicators include changes in **stock market prices**, average hours worked per week, **new orders for durable goods**, average initial claims for unemployment insurance, building permits, and new private **housing starts**.
- **Coincident Indicators –** normally move up and down simultaneously (coincide) with economic expansions and recessions. Examples include **industrial production** and manufacturing and trade sales.
- **Lagging indicators –** only move up and down months after economic conditions change. Examples include the **average prime rate** for bank loans, the **average duration of unemployment,** and the **unemployment rate**.

Increases in economic growth do not necessarily result mechanically in increases in job growth in the short term. For instance, if businesses are afraid that growth is temporary, they may rely on overtime from existing employees rather than hiring new workers. However, in the long term, subject to long and variable lags, economic growth does tend to result in job growth. In a sense,

sustained declines in the unemployment rates serve as one of the most important lagging indicators of economic recovery**.**

Economists commonly identify three or four **types of unemployment:**

- **Frictional unemployment –** affects workers who are unemployed as a result of the normal turnover of workers between jobs or of new entrants into the work force. Some of these workers may leave their employers voluntarily searching for something better. In other cases, employers may have discontinued employment, but the employees find new work relatively quickly. In a mobile society and given unavoidable "imperfections in the labor market," or "search costs" (i.e., the time needed to find and compare alternative jobs and to decide that it is not worth waiting for something else better), market economies unavoidably always have some level of this type of unemployment, even in "full" employment.
- **Structural unemployment –** affects workers who lose their jobs as a result of changes in the demands for goods and services (e.g., manufacturers of horse buggies when automobiles took off) or of technological advances that reduce the need for their current skills (e.g., car mechanics unused to electronics in automobiles). Addressing this type of unemployment normally requires retraining. The problem underlying this type of unemployment is not deficient aggregate demand, but the speed with which workers may be retrained to meet new demands and technologies.
- **Cyclical unemployment –** involves job losses resulting from the fluctuations in the business cycle. This type of unemployment is the key concern during recessions and decreases during expansions.

Note: The "*Full*-employment," "natural," or "non-accelerating-inflation" rate of unemployment (NAIRU) rates, are the rates below which unemployment may not fall sustainably without causing boom conditions that eventually may result in higher rates of inflation. If we identify only the three types of unemployment above, NAIRU would largely be the sum of *frictional and structural* unemployment.

- **Institutional unemployment –** Some economists identify this type of unemployment as that affecting workers who cannot find employment as a result of government restrictions on the economy, e.g., wage floors for younger workers, restrictions on the ability of small businesses to launch, etc. Since injections of aggregate demand may not help these workers and result in inflation, this type of unemployment would also be part of NAIRU. Differences in NAIRU across countries often result from different institutional frameworks and, thus, from different levels of institutional unemployment.

Lecture 1.13 – Interest Rates & Government Involvement in the Economy

Interest Rates

Interest rates refer to the prices that various borrowers (households, businesses, governments, even financial institutions) pay in exchange for "funds" (i.e., loans and bonds), and the prices that lenders (or depositors) receive in exchange for forgoing the use of their funds for various periods of time (ranging from long periods as in mortgages and certificates of deposit to potentially "zero" time, as in checking and savings accounts). Interest rates are determined by the demand and supply of funds. Businesses, for instance, may demand funds (loans) if they expect the return on their projects to exceed the interest rate they pay. Governments and households (e.g., students and younger home buyers) are, of course, also large demanders of funds (borrowers).

The supply of funds is affected by past and current saving by households (e.g., older ones) and many firms, but also by government monetary policy. Increases in the demand for loans (whether by households, businesses, or governments) put upward pressure on interest rates.

Types of interest rates include:

- **Nominal interest rates –** are those regularly quoted by financial institutions. Setting interest rates, financial institutions and markets will include "premiums" to protect themselves against expected problems, such as inflation, loan defaults ("credit risk"), etc. Of course, actual levels of inflation and loan defaults often vary from those expected when interest rates are originally set.
- **Real interest rates –** are adjusted for inflation. Calculations of real interest rates often seek to incorporate the rate of inflation that is expected in the future. In practice, such expectations typically largely mimic recent historical experience.
- **Risk-free interest rates –** are those that would be charged to borrowers if lenders had an absolute certainty of being repaid (i.e., no credit risk). Financial markets largely treat the rates paid on conventional United States Treasury securities (or Treasurys, i.e., it is not spelled Treasuries) as indicators of risk-free interest rates. The U.S. Treasury issues securities through a large range of maturities (from 4 weeks to 30 years) in both a conventional format (where the buyer bears inflation risk) and in an inflation-indexed format (i.e., TIPS, where buyers are compensated for deviations in the CPI). Interest rates on conventional U.S. Treasurys are indicators of risk-free rates plus an inflation premium. Interest rates on TIPS are indicators of risk-free rates. The difference between conventional and TIPS Treasurys for a given maturity are indicators of expected inflation over that maturity (even though there are also, typically small, liquidity premiums involved). For instance, if 10-year conventional Treasurys yield 2.0% and the 10-year TIPS yield -0.5%, then the expected inflation rate (plus the difference in liquidity premiums) over the next ten years would be 2.5%.
- **Federal funds rate (Discount rate) –** are those that commercial banks charge and pay one another for short-term loans of reserves (i.e., unlent cash, also called "federal funds") at the Federal Reserve System (the U.S. central bank, commonly called the "Fed"). In recent decades, the Fed has conducted monetary policy largely through "open market operations," i.e., setting a target rate for the federal funds rate and buying and selling short-term U.S. Treasurys (bills) to ensure that the actual (effective) rate in the federal

funds market matched its target. Below, in the section on monetary policy, we explain the details further.

- **Prime rate –** The rate banks charge their most creditworthy business customers on short-term loans. Throughout the last two decades, most banks have routinely set their prime rates at a 3% premium over the federal funds rate.

Government Involvement in the Economy

While the proper role and extent of government involvement is likely to be debated indefinitely, governments are very likely to continue to regularly intervene in many aspects of the economy for the foreseeable future through **fiscal policy, monetary policy,** and **regulatory policy**.

Fiscal Policy

Fiscal Policy involves governments setting, applying, and changing levels of taxes, subsidies, and government spending. Many economists argue that, if (1) economic production (GDP) is below potential, (2) the financial sector is failing to lend funds adequately, and (3) unemployment rates are too high, then governments may successfully use **deficit spending** as **expansionary fiscal** policy to increase aggregate demand and, thus, output. Deficit spending involves increasing spending levels without increasing tax revenues by an equivalent amount, or lowering tax revenues without decreasing spending by an equivalent amount.

The (federal) **deficit** is the amount by which (federal) government expenditures (or spending or outlays) exceed (federal tax) revenues (or inlays) within a period of time (typically, reported for one year, or one month). The U.S. government finances its deficits through the sale of U.S. Treasurys (called bills, notes, and bonds depending on their maturity). The (federal or national) **debt** is the total amount of outstanding U.S. Treasurys or the sum of past deficits (subject to some adjustments as some government agencies hold securities issued by other branches of government).

Conversely, if (1) economic production is above potential and (2) there are concerns about boom economic conditions and current or upcoming rates of inflation that are too high, then governments may run budget surpluses as **contractionary fiscal** policy (increase taxes) to reduce aggregate demand and, thus, inflation. Historically far rarer, (federal) surpluses involve revenues exceeding expenditures.

Types of taxes include income and payroll taxes (like those for social security and Medicare) and international trade tariffs (all of the above chiefly used by the federal government), sales (consumption or excise) taxes (chiefly used by state governments), and property taxes (chiefly used by local governments). Current income taxes use “progressive” tax rates that are higher for those with higher incomes and zero or, even negative, for those with lower incomes. Some economists argue that income taxes reduce incentives for individuals to work and, conversely, that switching to consumption taxes would increase incentives for individuals to save.

Monetary Policy

Monetary Policy involves efforts by the central bank of the U.S., the Federal Reserve System (or “Fed”) to manage credit conditions, interest rates, and the money supply. Like other elements of macroeconomic policy, the key goals of monetary policy include (1) maximizing economic growth, (2) minimizing unemployment rates, (3) minimizing inflation rates, and (4) minimizing economic and financial fluctuations, i.e., ensuring financial stability, minimizing boom-bust cycles, avoiding financial crises, and minimizing failures of financial institutions. The Fed has several tools at its

disposal to carry out **expansionary monetary policy** (e.g., to reduce unemployment rates) and **contractionary monetary policy** (e.g., to reduce inflation rates). Some of these tools include:

- **Reserve requirements (ratio) –** The Fed may affect the total amount of lending in the economy (e.g., tighten/loosen credit conditions) by changing (i.e., increasing/decreasing) the percentage of customer's deposits that the Fed requires banks to hold in reserve (i.e., not to be loaned out). In recent decades, the Fed has rarely changed reserve requirements, i.e., it has effectively not used them as a tool of monetary policy.
- **Discount rate –** The Fed may affect the total amount of lending in the economy (e.g., tighten/loosen credit conditions) by changing (i.e., increasing/decreasing) the interest rate (called the discount rate) that it charges banks for short-term emergency loans. Except in, fortunately, still relatively rare crisis conditions, few banks request these types of loans to avoid the stigma of informing the Fed (their regulator in many cases) that they need "emergency" help. Thus, in recent decades, the discount rate has largely not been a key tool of monetary policy.
- **Open-market operations –** In recent decades, the Fed has conducted monetary policy largely through "open market operations," i.e., setting a target rate for the federal funds rate and buying and selling short-term U.S. Treasurys (bills) to ensure that the actual (effective) rate in the federal funds market matched its target. When the Fed is concerned about high unemployment rates, it can engage in expansionary monetary policy by lowering its target for the federal funds rate, buying government securities on the open market, thereby increasing the amount of reserves available for banks to lend (the money supply).

When the Fed is concerned about boom conditions or current or expected high inflation rates, it can engage in contractionary monetary policy by increasing its target for the federal funds rate, or selling government securities on the open market, or both, thereby decreasing the amount of reserves available for banks to lend (the money supply).

Until the financial crisis, the federal funds rate was routinely substantially above 0%. Under such conditions, many observers interpreted monetary policy as largely involving changes in interest rates. At that time, increasing (reducing) interest rates (i.e., akin to the *price* of credit) would typically make credit conditions tighter (looser), i.e., reduce (increase) the *quantity* (or the rate of increase) of money (and eventually lending).

During the years following the financial crisis of 2008, the federal funds rate was almost zero (the Fed could technically have insisted on banks formally charging one another negative interest rates, but it did not). Thus, when, for instance in 2013, the Fed engaged in open market operations to buy Treasurys, and increase the *quantity* of money, the Fed did not formally affect the federal funds rate (a *price*), i.e., the federal funds rate remained at almost zero and did not formally become negative in nominal terms. Since Fed open market operations then did not formally affect the level of the federal funds rate (i.e., a *price*), but only affected the *quantity* of money, these types of policies are widely known as **quantitative easing**.

Another difference between Fed open market operations before and after the financial crisis is that before the crisis, the Fed bought almost exclusively Treasurys and now the Fed buys large amounts of real estate-related securities (albeit issued by Fannie Mae and Freddie Mac, institutions currently managed by the federal government).

Monetary policy may impact economic conditions because looser (or tighter) credit conditions may affect the decisions of individual economic agents (e.g., households and businesses). Looser credit

conditions (e.g., lower interest rates and more readily available credit) tend to stimulate consumer and business spending (and thus aggregate demand). Tighter credit conditions (e.g., higher interest rates and less readily available credit) tend to discourage consumer and business spending, of course. Because monetary policy is beset with long and variable lags that may be several years long, achieving the many goals of monetary policy sustainably is not easy in practice.

Economists use a variety of measures to track credit conditions, including interest rates, lending volumes, surveys of underwriting standards, and monetary aggregates such as the **monetary base, M1,** and **M2**. While the theoretical relationship between money, output, and prices (subject to lags) still stands, (1) far deeper financial markets, (2) the large role of the U.S. dollar abroad, (3) regulatory changes, and (4) technological innovations have jointly reduced the relevance of short-term changes in monetary aggregates in predicting the short-term impacts of monetary policy.

Regulatory Policy

Governments may further influence economic activity through regulations affecting environmental issues, labor issues (e.g., immigration and minimum wage laws), occupational health and safety, energy policy, healthcare, bank capital, lending practices, etc. On one hand, governments may choose to channel resources from disfavored sectors to favored sectors. On the other hand, governments could seek to reduce the likelihood of financial crises, for instance, by requiring banks to develop thicker capital cushions over time, or by adjusting minimum permissible mortgage downpayments if other housing bubbles surfaced in the future.

Economic Theories

There are several theories and schools of thought in macroeconomics that seek to explain recurring business cycles and whether, how, and how much governments contribute to alleviating or worsening business cycles. Some theories focus on the **private sector** (changing consumer and business confidence, and periodic unbridled lending excess by the financial sector) as chief contributors to economic and financial instability. Other theories focus on **government actions**, and their poor timing and incentives, as chief contributors to economic and financial instability. Few practicing macroeconomists openly embrace one of the following labels, but the labels remain useful for identifying the overall background behind various policy proposals.

- **Classical economic theory** (no government intervention) argues that, in the absence of government-induced distortions (e.g., price and wage controls, restrictions on banks' note issuance and lending, and restrictions on banks' geographic expansion, like branching restrictions), economies would be largely self-stabilizing, with only relatively small fluctuations in unemployment and inflation rates. This theory **does not support government intervention**, like fiscal policy or monetary policy, to manage macroeconomic conditions.
- **Keynesian theory** (fiscal policy – lower taxes and more government spending) argues that prices and wages in the economy do not adjust quickly enough on their own. Thus, economies would not self-stabilize quickly enough and governments must use ***Fiscal Policy*** to manage macroeconomic conditions, for instance, increasing budget deficits (lower taxes or more government spending) during recessions and running surpluses (higher taxes or less government spending) during expansions or, at least, during periods of high inflation.
- **Monetarist theory** (monetary policy – open market operations) argues that to minimize fluctuations in both unemployment and inflation rates, central banks (e.g., the Fed) should target rates of growth in money (and thus lending) that are stable over time. This theory focuses on **stable Monetary growth**, not on stable interest rates; so, the Fed would (1)

allow interest rates to climb if banks and borrowers wanted to lend and borrow more than the long-term average growth rate of money (and lending) and (2) allow interest rates to fall if banks and borrowers wanted to lend and borrow less than the long-term average. This theory argues that efforts by the Fed to occasionally increase monetary growth by more than the long-term average are more likely to add instability (i.e., worse boom-bust cycles and inflation) than to succeed in minimizing instability.

- **Supply-side theory** (reduce taxes) argues that government policy should focus less on managing short-term fluctuations in the aggregate demand curve, and more on removing impediments to economic production (saving, investment, work, innovation), thereby shifting the aggregate supply curve outward over the long term. This theory underpins investigating what government laws and regulations may be counterproductive and updating or removing them. The most well-known application of this theory is the **Laffer Curve**. This curve points out that if tax rates are high enough, increasing tax rates further will not yield more revenue (e.g., in an extreme example, workers will work less if the tax rate is 100% than if it is 50%). Under such conditions, **lowering tax rates** may actually increase tax revenues. An example of an application of this theory took place during the Kennedy administration, as maximum income tax rates were lowered from 90% to 70%.
- **New Keynesian theory** represents the closest to whatever consensus there is today in macroeconomic thinking by combining some elements of Keynesian and monetarist theories. The theory argues that the relationships between monetary aggregates and economic conditions have been too loose to rely strictly on a constant (i.e., very, very stable) rate of monetary growth to minimize fluctuations in unemployment and inflation rates. The theory argues that policymakers should use both ***Fiscal and Monetary*** **Policy** to manage macroeconomic conditions, loosening (or tightening) both in response to higher rates of unemployment (or inflation).
- **Austrian theory** provides some insights as to how monetary policy may lead to dislocations in the allocation of resources, play a role in the formation of bubbles, and contribute to boom-bust cycles (i.e., make the economy less stable). For instance, excessively low interest rates at one point may push businesses to initiate more long-term oriented projects (e.g., factories and housing developments) that, once finished, may turn out to have overestimated actual consumer demand. The resulting oversupply in one sector (e.g., housing) may result in higher unemployment in that sector and, as excess inventories may take long to be worked out, recovery may be slow.

Lecture 1.15 – International Trade & Economic Globalization

International Trade Theory

International trade theory, and the overwhelming majority of the evidence on international trade, show that trade among individuals and firms across borders is mutually beneficial, i.e., over time trade tends to increase the average standards of living for all countries involved. Trade across countries, like that among individuals within a country, increases overall production (and consumption) as the different parties specialize in producing more of the products and services that, as a result of differences in resources, climate, and specific skills, each party can produce more of. Economists differentiate between two types of trade-related advantages:

- **Absolute advantage –** A country being able to produce a good at a lower cost than another country.

For example, companies and/or farmers in Germany may be able to produce one small car, paying workers $12,000, and one ton of sugar, paying workers $300. Companies and/or farmers in Haiti (having access to worse factories, equipment, transportation systems, irrigation, etc., and fewer well-trained employees) may be able to produce one small car, paying workers $36,000, and one ton of sugar, paying workers $400. In this example, Germany would have an absolute advantage in the production of both products, i.e., costs are lower in Germany. Note that the comparison does not focus on hourly wages, but on costs of producing a certain amount of output. Having more equipment, German workers may require fewer hours to produce the same output.

- **Comparative advantage –** A country being able to produce a good at a lower relative cost than another country (the *opportunity costs, the amounts of the other good given up,* are less).

In our example, if Germans want to consume 40 more tons of sugar by shifting German labor away from car production, their production (and consumption) of cars falls by 1 car (= 40 × 300 / 12,000). In contrast, if Haitians reduced their production of cars by 1, they could increase production of sugar by 90 tons (= 36,000 × 1 / 400). If instead of reducing German car production by 1, (1) Germans increased car production by 1 and reduced sugar production by 40, (2) Haitians reduced their car production by 1 and increased sugar production by 90, and (3) Germans sold the extra car to Haiti, if Haitians shipped an amount of sugar higher than 40 tons and lower than 90 tons (i.e., between the relative costs in each country), then both countries would be able to consume more sugar and thus have increased their material standard of living (for simplicity, we designed this example such that consumption of cars did not change in either country).

International trade theory shows that even if one country had an absolute advantage in the production of all goods (like Germany in our example), for every pair of countries and every pair of goods, one country will have a comparative advantage in the production of one good (e.g., Germany in cars) and the other country will have a comparative advantage in the production of the other good (Haiti in sugar), such that both countries will be better off if each specializes in what they are better at (relative to the other) and they trade with one another.

Obstacles to International Trade

While all countries on average theoretically benefit from international trade, large fractions of goods and services are not traded across international borders. There are many barriers to international trade; some are "natural" and some are the result of government policy.

Examples of **natural barriers** to international trade include **transportation and information costs**. While a simple mathematical calculation (as the one shown above) might imply that China has a comparative advantage on warm dumplings and the U.S. on hot French fries, we do not observe massive shipments of dumplings and French fries in either direction daily. Simply, transportation costs may overwhelm the cost reductions promised by trade. In this extreme example, the costs of ensuring that French fries are delivered warm to China are prohibitive. As a result of transportation costs, many personal services (haircuts, restaurant food, etc.) are produced and consumed domestically, with little international trade. However, as transportation costs continue to fall (container ships, etc.), in recent decades, larger and larger fractions of economic production are involved in international trade.

Since economic conditions are constantly changing in every country, the relative costs of many products across many countries are always changing. While there are theoretical benefits from international trade, most firms find it easier to keep track of relative costs in a relatively smaller number of markets, and in particular those that are closer by. Economists use the term "information costs" to describe the fact that individuals and firms routinely forgo many possible gains from trade.

In recent decades, improvements in communication technology have also greatly reduced information costs and increased the scope for international trade. In a recent (if domestic) example, fishermen off the coast of India started receiving far better prices on their fish by using cell phones from the sea to check the prices available for various fish in various ports, instead of routinely selling all their fish in one single port. Improvements in information technology also play a role in the growth of international trade in services (call centers, technical support, accounting and legal services, etc.).

Many **governments** have historically established additional barriers to international trade. Historically, the most common type of trade barrier had been **tariffs** (taxes on imported goods). Domestic industries that are losing market share to foreign competitors (e.g., textiles, furniture, some food products in the U.S.) often advocate trade restrictions. Below we summarize some effects of trade restrictions.

- **Domestic Producers of protected goods** – Positive. The demand curve they face shifts to the right as the availability of substitute goods has been reduced. They sell more goods at higher prices. Managements and unions typically sought the restrictions as both parties benefit from higher sales and prices, with some of the gains passed on to owners, managers, and workers (in the form of higher wages and more job security than they would have otherwise).
- **Domestic Users** – Negative. The supply curve they face shifts to the left, forcing them to pay higher prices and being able to buy fewer goods.
- **Domestic Producers of exported goods** – Negative. The demand curve they face shifts to the left, as their consumers are made worse off overall by the higher prices they pay on protected goods. Since these negative impacts are diffused across many industries and the positive impacts of protection are concentrated on the protected industries, often each

individual protected industry can lobby effectively for its protection without major opposition from all the other industries that are hurt only by a small amount (per industry).

- **Foreign Producers encountering protection elsewhere** – Negative. The demand curve they face shifts to the left, resulting in lower sales and prices.
- **Foreign Users of protected goods** – Positive. The supply curve shifts to the right, as their producers will have to do more selling in their own market. They buy more goods at lower prices.

Learning from the negative effects of **trade wars** during the interwar period and the Great Depression, throughout the second half of the twentieth century, many governments have moved to reduce many trade barriers and to coordinate some aspects of their economic policies. The **World Trade Organization (WTO)** is an international organization that (1) provides a forum to continue to negotiate greater liberalization of international trade policies, (2) provides a forum to resolve international trade disputes, and thus (3) seeks to help prevent trade wars and the growth of other trade barriers. Under the **North American Free Trade Agreement (NAFTA),** the *U.S., Mexico, and Canada* impose far lower trade restrictions on one another than on other countries.

Following the financial crisis, the **G-20** is the main forum that the governments of the leading countries of the world use to discuss global economic and financial stability. As its name implies, it brings together 20 leading economies, but for the first time includes both higher income (or industrialized or developed) countries and lower income (or emerging or developing) countries.

The **European Union (EU)** provides another example of international efforts to remove international barriers to trade. In its current format, the EU includes 28 European countries. The EU is commonly defined as an "**economic union**," providing for the free circulation of goods, services, firms, capital, residents, and labor. Combining some characteristics of a confederation and a federation, EU countries have many laws in common. 17 EU countries also share a single currency (the euro) and, thus, form a "**monetary union,**" known as the euro area or **Eurozone**. The European Central Bank (ECB) sets monetary policy for the Eurozone. The 19 Eurozone countries are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain.

One example of governments' efforts to reduce trade barriers is that since World War II, many have increasingly reduced their reliance on tariffs as a means of trade protection. However, just as they moved away from tariffs, many countries continue to experiment and switch to other less transparent means of protection, such as import quotas; embargoes; foreign-exchange controls; subsidies; and technical, health, and safety requirements. Import **quotas** place limits on the quantity of a good that may be imported during a period. ***Embargoes*** are total bans on importing either a number of goods or nearly all goods from a country (e.g., the U.S. may place an embargo on armaments from specific countries, or on nearly all goods from Cuba).

In an example of how protection efforts can become blurred and complex, during the 1980's, the U.S. auto industry realized that the U.S. government was formally restricted by its international agreements from imposing tougher explicit restrictions on Japanese competitors. Thus, the U.S. auto industry pushed the U.S. government to push the Japanese government to push the Japanese auto industry to self-impose "voluntary" quotas, called "**voluntary export restraints" (VER).** One key result of these policies was Japanese companies switching from producing in Japan to sell in the U.S., to setting up factories in the U.S. to sell in the U.S.

Many governments also attempt to manipulate trade through **foreign-exchange controls.** These policies may restrict the types of domestic parties that may use foreign currencies, their amounts, and their uses. Governments may use these policies to favor some industries over others (e.g., encourage high tech imports over luxury goods, or vice versa, favor government-owned companies over domestic citizens traveling or studying abroad, etc.). Some countries operate multiple exchange rates, requiring more or less favored domestic parties to use the various rates for different purposes.

Dumping involves a manufacturer being found to have exported a product to one country at a price that was unjustifiably low and harmed the domestic producers of that country. In practice, World Trade Organization (WTO) and U.S. regulations to determine whether firms priced their products below their costs of production are difficult to maneuver for all parties (e.g., the calculations may take into account not only the exporters' costs of production but also those of their domestic competitors).

Companies operating in different countries (with different currencies) may engage in **dual-pricing** strategies, for instance, charging customers in new markets lower prices to introduce them to their products, or charging customers in countries with more elastic demand curves lower prices (even though that may open them to accusations of dumping).

Many governments also use **export subsidies** to encourage the production and export of specific products. Subsidies may take many forms, some more or less overt, ranging from outright payments to favored tax treatment, or access to subsidized lending. Under WTO rules, if a WTO panel finds that one country is in breach of international trade rules (e.g., by having illegal export subsidies) and the country refuses to correct the situation, the countries bringing the complaint may impose **countervailing duties** (i.e., tariffs) for an equivalent amount on products from the offending country.

Balance of Payments (BoP)

The Balance of Payments summarizes a country's transactions with other countries during a period of time. Its two key components are the current account and the capital account.

The Current Account focuses on the flow of goods and services. It also includes flows of government grants, net interest and dividends, and net unilateral transfers during a specific period of time.

- **The Balance of Trade** is the difference between *goods* exported and goods imported, excluding services. If exports are higher, a *trade surplus* exists. If imports are higher, a *trade deficit* exists.
- **The Balance of Goods and Services** is the same comparison, but with both *goods & services* included. However, in common parlance, observers often refer to the more comprehensive term of "deficits in the balance of goods and services" simply as "trade deficits."
- **Net Interest & Dividends** are interest and dividends received within a country from investments outside the country minus the interest and dividends paid to residents outside the country for investments within the country.
- **Net Unilateral Transfers** include foreign aid, payments to relatives and pension payments. They affect the deficit or surplus depending on whether the transfer is in or out of the country.

The Capital Account focuses on the flow of investments in fixed and financial assets during a specific period of time. The capital is largely a reverse image of the current account. If a country experiences a deficit on its balance of goods and services, i.e., foreigners sold more into the country than they bought from it, then those foreigners hold more of the country's assets (whether simply domestic currency or, exchanging that currency for something else, other assets such as stocks, bonds, land, etc.). Thus, the country with a current account deficit (more imports than exports) will have a matching capital account surplus (an increase in foreigners' holdings of the country's assets).

The International Monetary Fund (IMF) is another international organization that seeks to aid in the coordination of countries' economic policies. During crises, some countries may find that they may obtain funding to cover their short-term deficits in their balance of payments from private parties (e.g., banks granting loans to governments or individuals buying government bonds) at only very high interest rates, or that they may not obtain private funding at all. At those times, the IMF may not only be the only party willing to provide **funding at relatively low interest rates**, but also maybe the only party willing to provide funding at all. In exchange for short-term help during a crisis, the IMF typically requires countries to reduce their budget deficits and debts and engage in other supply-side "**structural reforms**" over the long term (privatization, deregulation, opening of closed sectors to competition from small businesses and foreign companies, etc.).

Foreign Exchange Rates

The exchange rates between countries' currencies are very important to any company that faces foreign competitors regardless of whether the company is an exporter facing competitors abroad or the company faces imports from foreign competitors domestically. When a foreign country's currency weakens, products from companies from that country become cheaper for purchasers in the U.S., providing those foreign companies' products an advantage. Fluctuations in currencies' exchange rates are ultimately based on relative changes in the supplies and demands of those currencies. However, the importance and speed with which various factors affect exchange rates is only poorly understood. In the last few decades, we have learned that, for instance, the purchasing powers of two currencies may drift apart considerably (20%-40%) for extended periods of time (one or two decades) before the two currencies' purchasing powers converge again. For instance, one might expect that if one country's inflation rate is 40% higher than another's, its exchange rate will fall by 40%, but, in practice, the exchange rate may only fall by 20% for an extended period of time. Companies considering decisions regarding short-term international trade and long-term international investments face these types of (nominal and real) exchange rate risks. **Repatriation** is the process of converting a foreign currency into your own country's currency ($U.S.), at the current exchange rate.

Exchange rates may be expressed by dividing by either currency, e.g., if €1 (i.e., 1 euro) buys $1.25, the exchange rate may be expressed as €1 = $1.25, or $1 = €0.80. In a table listing multiple exchange rates for one currency, it is customary to express all exchange rates on the same basis, e.g., how many units of the various foreign currencies does it take to buy $1. It is also customary to choose the "direction" of the exchange rates that ensures that most exchange rates are greater than 1 (i.e., $1 = 80 yen, instead of $0.0125 = 1 yen).

Commonly cited exchange rates between currencies include:

- **The Spot rate** is the exchange rate at which a financial party (a financial institution, a currency dealer, etc.) will exchange two currencies at this time, i.e., "on the spot."
- **The Forward rate** is the exchange rate at which a financial party will exchange two currencies at a specific future date (called the settlement date), e.g., three months later.

In forward markets, one currency is at a premium (discount) if its forward rate is higher (lower) than the spot rate (both rates expressed per the foreign currency), i.e., if it is expected to appreciate (depreciate). For instance, according to the spot rate, 1 Kuwaiti dinar may equal $3.57, and according to the 3-month forward rate, 1 Kuwaiti dinar may equal $3.53. In this case, there is a discount since the Kuwaiti dinar will be worth less in the future (i.e., it will buy fewer dollars). The size of the forward premium (or discount) is expressed in annual terms as follows:

$$\frac{\text{Forward rate} - \text{Spot rate}}{\text{Spot rate}} \times \frac{\text{Months in a year}}{\text{Months in the forward period}}$$

$$\frac{3.53 - 3.57}{3.57} \times \frac{12}{3} = -4.5\%$$

Some commonly cited *factors affecting foreign exchange rates* include:

- **Inflation –** Currencies from countries with higher inflation rates tend to depreciate (fall in value) relative to others. Because holding one unit of the currency with higher inflation purchases fewer goods and services, demand for those currencies falls.
- **Interest rates –** Currencies from countries with higher (inflation-adjusted, or real) interest rates appreciate (rise in value) relative to others. Since individuals and firms may shift some of their funds to those countries, demand for those currencies rise.
- **Balance of payments –** Currencies from countries that are net exporters (i.e., that have surpluses of goods and services) appreciate. Since net importers (i.e., the countries with other currencies) ultimately use the currencies of the net exporters to pay for their goods, demand for those currencies rise.
- **Government intervention –** In the long term, central banks' policies (interest rates and resulting inflation rates) are the key determinants of the exchange rates of their countries' currencies. In the short term, however, many central banks seek to manage their currencies, i.e., prevent short-term fluctuations away from long-term underlying trends, through the buying and selling of their holdings of foreign currencies. For example, official reserves are often held in the form of short-term securities from the leading countries in the world, e.g., the U.S., and each individual country's main trade partners.
- **Long-term economic stability –** Currencies from countries that are generally perceived to be more stable tend to endure fewer short-term fluctuations, i.e., currency markets will respond faster and more strongly to changes in factors that affect exchange rates in countries with worse long-term records in stability. For instance, short-term increases in inflation or budget deficits in Switzerland are less likely to cause the Swiss franc to depreciate than similar changes might have on the currencies of other countries. Under the **safe haven** effect, during international crises, international investors tend to buy more of the currencies of countries traditionally perceived to be more stable (e.g., the dollar, the Swiss franc, etc.).

Countries use a variety of **exchange rate systems** to manage the value of their currencies relative to those of other countries:

- Under **floating exchange rates,** a country's central bank never (or rarely) buys and sells foreign currencies (i.e., intervenes in foreign exchange markets) to influence the exchange rate of its currency relative to those of the other countries. Instead, the currency's exchange rates are set by the supply and demand of the currency by private parties (for travel, international trade, and international investment) as well as by the actions of other

foreign central banks. Relatively few countries have ever used pure versions of floating exchange rates.

- Under **fixed exchange rates,** a country's central bank stands ready to buy and sell foreign currencies as needed constantly to maintain its exchange rate "fixed" relative to the currency of a key trading partner (e.g., dollar, the euro, the British pound). If a country simultaneously (1) permits its individuals and firms to buy and sell foreign currency somewhat freely and (2) wants to maintain a fixed exchange rate, then the country's central bank effectively forgoes control of its own monetary policy, largely having to match the monetary policy of the country against which it fixed its currency. The central banks of countries that pursue separate monetary policies (for instance, by having higher inflation rates) eventually run out of official reserves, and abandon their fixed exchange rates. Many countries attempt to fix their exchange rates, but find that they have to periodically "reset" the value of their "fixed exchange rate." A monetary union (like the euro) is an extreme form of fixed exchange rates. However, historically, monetary unions may break apart.
- **Managed exchange rates** fall somewhere in between floating and fixed exchange rates. Under these systems, a country's central bank may buy and sell foreign currencies to minimize short-term fluctuations in exchange rates away from long-term underlying trends, and/or target a broad band within which the currency may fluctuate (e.g., plus or minus 15% of some value of an exchange rate against the currency of a key country (or occasionally a basket of currencies). There are a variety of types of managed exchanged rates, and terms, ranging from formal "pegs" (closer to pure fixed exchange rates) to "dirty" floats (closer to pure floating rates).

Companies with operations in more than one country bear various types of **foreign exchange (or currency) risk**:

- A company with operations in countries with different currencies will likely have assets and liabilities in more than one currency. Creating financial statements (e.g., balance sheets) that cover the whole company will require using exchange rates to convert the value of the assets and liabilities from one country's currency into the currency used where the company is headquartered. Changes in those values resulting from changes in exchange rates involve **translation (accounting) risk** and are entered as gains or losses on the balance sheet as other comprehensive income (OCI)**.** Companies may seek to manage their translation risk by **matching assets and liabilities** in each market where they operate. For instance, a company operating a plant (or a distribution network) in a foreign country might finance those operations in the local currency (i.e., through loans with local banks or by issuing bonds in that country's currency).
- A company with operations in countries with different currencies will likely have streams of future revenues and costs in more than one currency. Thus, forecasting future earnings, expressed in the currency used where the company is headquartered, will involve one additional type of risk that is known as **transaction risk**. Companies may seek to manage their transaction risk, similarly, by **matching** as many **revenues and costs** as possible in each market where they operate. For instance, a Japanese company selling cars in the U.S. would reduce the volatility of its earnings if its dollar-denominated revenues were matched by dollar-denominated labor costs, i.e., by producing some of those cars in the U.S. Short of matching revenues and costs by currency, companies also use derivatives, or ***hedging contracts*** to manage these risks.
    - **Options** permit, but do not require, holders to buy or sell commodities (e.g., a specific type of wheat) or instruments (a stock, bond, or currency), at a given price

until some date (under an American option) or at some date (under a European option).
    - **CALL** Options permit the holder to BUY a security at a fixed price.
    - **PUT** Options permit the holder to SELL a security at a fixed price.
  - **Forwards** are specifically-negotiated contracts in which two parties agree to exchange (one party buys and the other sells) some quantity of a commodity or instrument (e.g., currency) at a pre-set price on a future date. Forwards differ from options in that they do not just permit the exchange, but require both parties to participate.
  - **Futures** are standardized versions of forward contracts that are traded (bought and sold) in exchange markets (like the Chicago Board of Trade or the Chicago Mercantile Exchange). Future contracts have standardized sizes (e.g., $1 million) and dates (e.g., the end of a quarter).
  - **Currency swaps** contracts under which one party A agrees to make payments in one currency to another party B (e.g., twelve monthly payments of 10 million pesos) and the other party B agrees to make payments to party A in the other currency (e.g., twelve monthly payments of $1 million) independently of how spot rates change during that period of time.
  - **Money market hedges** involve turning transaction risk (which may result in either gains or losses) into a loan. This strategy involves the cost of certain interest payments, but removes the possibility that currencies may change unfavorably. In our example above, a U.S. company expecting 12 monthly payments of 10 million pesos could take a loan whose repayment schedule was 12 monthly payments of 10 million pesos (or twelve separate loans with single payments each one month apart) and convert the peso proceeds from the loan(s) into dollars today using the spot rate.

Asset-liability matching, derivative products, and other techniques may be used to hedge or manage a variety of business risks. For instance,

- Financial institutions bear **interest rate risk**, or the risk that changes in economy-wide interest rate levels may affect their earnings adversely. Typically, banks have assets with longer maturities (including for instance some long-term mortgage loans) and liabilities with shorter maturities (including for instance relatively few long-term bonds and few CDs with maturities much longer than one year). As a result, increases in interest rates may leave banks with assets that reprice slowly (i.e., they continue to pay the low interest rates they started charging in previous years) and liabilities that reprice quickly (i.e., they will pay higher rates on most liabilities quickly). Again, financial institutions may manage this risk (1) by seeking to reduce the amount of assets with long maturities and to increase the amount of liabilities with long maturities. They may also (2) reduce the amount of fixed-rate long-term assets and increase the amount of variable-rate long-term assets. Financial institutions may also (3) use interest rate derivatives (including swaps), albeit the fees for interest rate derivatives grow larger and larger the further out one seeks to be protected.
- Financial institutions, as well as other companies, bear **credit risk**, or the risk that the parties that one has lent to, or who owe payments, may fail to pay. Standard techniques to deal with credit risk include (1) diversifying one's customers, (2) selling future streams of payments, i.e., turning from being a lender who "originates to hold" and earns profits from interest payments to being a lender who "originates to distribute" and earns profits from origination fees, (3) implementing internal control mechanisms to ensure that credit standards are appropriately tight, (4) requiring greater guarantees from borrowers (e.g., requiring larger downpayments or other forms of collateral, and (5) using derivatives, such as credit default swaps (CDS). Companies, and other investors, holding bonds issued by

third companies may purchase CDS that are essentially insurance products that protect against defaults on bonds in exchange for premiums. (Sophisticated) investors holding bonds (or debts) owed by companies for which CDS are not available may still purchase portfolios of CDS to protect themselves if not exactly against the default by their particular borrower, at least against the threat of an economy-wide surge in defaults (since defaults, to a large extent, do typically take place in waves when there are economy-wide problems).

- Financial institutions, as well as other companies, bear **liquidity risk**, or the risk that while they may be solvent on a long-term basis (i.e., their long-term revenues outweigh their long-term costs), during a crisis situation, their short-term obligations might outweigh their access to liquid funds, forcing them to sell long-term assets at "**fire sale prices**" or at depressed prices, effectively making them insolvent in the short term and, hence, indefinitely. Companies may manage their liquidity risk (1) by matching more the maturities of their assets and liabilities such that, as liabilities come due, some assets can be liquidated at full prices. Companies may also seek to (2) maintain a large cushion of liquid assets (cash and short-securities) albeit at the cost of foregoing returns on those assets. Companies may also (3) maintain a variety of long-term lines of credit with a variety of providers. Of course, the greater the number of lines, the more secure that they are, and the longer they extend into the future, the higher the fees they will involve.
- Financial institutions, as well as other companies, bear price or **market risk**, or the risk that sales of their products or the value of some of their assets may decline. To manage this risk, companies may (1) shift their financing sources from debt to equity, since equity can accommodate more easily temporary declines in the value of their assets. Companies may also seek to (2) diversify their income streams and the assets they hold, albeit greater diversification may be accompanied by losses in managerial focus. (Sophisticated) companies may (3) use hedging strategies such as purchasing instruments whose value will increase should the company, its competitors, or the economy as a whole experience difficulty. At the simplest level, "shorting" the S&P 500 stock index provides some protection against short-term, market risk.
- Companies also bear **country risk** when investing overseas, which affects profits and the value of assets, as they have very little control over the political and financial risks associated with investing in a foreign country.

Globalization

Economists use the term globalization to describe how the economies of nearly all individual countries in the world are developing increasingly deeper connections in their markets for goods, services, labor, capital, and technologies. Globalization plays a role in many deeply transformative processes that have been ongoing for several decades now:

- **Increased foreign direct investment (FDI).** Many companies from developed countries operate in multiple other countries, both developed and developing, operating factories, research facilities; call, service and technical support centers; and distribution networks. Growing levels of FDI have contributed to the growing importance of intra-company international trade and to growing levels of international transfers of technology and knowhow.

  Economic theory had traditionally expected that richer countries, having lower growth prospects, would have excess savings (i.e., be net savers). Poorer countries, having higher growth prospects, would have saving deficits (i.e., be net borrowers). Thus, richer countries would finance projects in poorer countries whether the financing took place as foreign direct or indirect investment, or through loans.

However, following the East Asian financial crisis of 1997-98, a large number of developing countries have engaged in policies that promote internal saving and the accumulation of international reserves (largely assets from developed countries like the U.S.). Independently of the precise causes and contrary to the traditional expectations of economic theory, over the last few decades many poorer countries have become net savers (and lenders) to richer countries, many of which became net borrowers. Much of the flow of funds into developed countries did not go to financing business investment but residential real estate and consumption. Along with traditional official reserves (i.e., government securities), poorer countries' position as net savers has also surfaced in the form of growing numbers of companies from developing countries that, like traditional multinationals from richer countries, are now expanding their operations both in other developing countries and in developed countries.

- **Increased foreign indirect, or portfolio, investment**. Seeking diversification in their portfolios, international investors have been shifting growing fractions of their savings into financial (or portfolio) assets (i.e., stock and bonds) denominated in the currencies of other countries. This shift undoubtedly helps individual savers, and may help improve how well international savings flow to the countries with the most promising projects, but it also results in a greater interconnectedness among all financial markets, such that the share of foreign owners in any individual market that might flee during international crises has increased. The traditional tendency of most investors to have a large fraction of their portfolio in assets denominated in their own currency is described as **home bias**.
- **Falling natural and artificial barriers to international trade** (transportation, information, and communication costs, and tariffs) have resulted in many forms of greater interconnectedness across countries, including growing levels of international trade, growing levels of international business and tourism travel, and growing levels of immigrant populations worldwide including both skilled workers (expatriates) and less-skilled workers (e.g., Latin Americans in the U.S., Middle Easterners and Africans in Europe, South and East Asians in the Persian Gulf, etc.).
- **Increased modernization of developing countries**. Companies from developed countries may once have operated in developing countries primarily to extract natural resources and to benefit from their lower labor costs. However, growing fractions of the developing world have long not fit neatly into a classification of the world into rich and poor countries. Many countries once considered developing have levels of human development, education, standards of living, and income that far exceed those of countries that have long been considered developed. Examples of such countries and regions that have "graduated" from their developing status include South Korea, Taiwan, Hong Kong, Singapore, and others. Many other developing countries have large and growing middle classes (e.g., Brazil, Russia, India, China, and Mexico).

Operating across multiple countries, managers and employees benefit from being aware about how many societal norms, customs, values, and accepted behaviors may differ widely across countries. If not prepared properly, these differences may derail negotiations, management-labor relations, marketing research and efforts, product launches, and ultimately negatively affects revenues and earnings. However, many societal norms might be merging. Societal norms that were once common only among developed countries are spreading throughout the rest of the world, including increased democratization, greater government transparency, greater openness of more business sectors to competition from the private, domestic, and foreign sectors, etc. Simultaneously, and perhaps paradoxically, there is both a homogenization of consumer tastes (i.e., some brand names are recognizable worldwide) and greater consumer choice (products from

more countries, once thought exotic, are available in more places). Along with greater incomes, some of the ills common in developed countries are also fast spreading among developing countries (e.g., growing occurrence of health conditions associated with more sedentary lifestyles, such as obesity, diabetes, heart conditions, etc.).

Despite having labor costs that are higher per hour worked, companies in developed countries have long been able to compete with companies in developing countries. Companies and workers in developed countries may compete with those in developing countries ultimately because the relevant comparison does not revolve around costs per hour worked, but costs per unit produced. As we showed above in the example regarding comparative advantage, taking into account the amount of equipment (machinery, transportation infrastructure, etc.) and education and labor skills, workers in developed countries (Germany in our example) may actually be more productive than those in developing countries (Haiti in our example). Expressed differently, the labor costs per unit produced (for one car) may be lower for many products in a developed country than in developing countries, even if workers in developed countries earn higher wages per hour. In less theoretical terms, **reasons that companies in developed countries are able to compete with those in developing ones include:**

- Greater ability to develop, maintain, and use advanced machinery and technology to enhance the productivity of their more educated and skilled workforces.
- Using more sophisticated process management techniques like just-in-time and continuous improvement.
- Continually searching for ways to add value and move higher up the value-added ladder through research, innovation, and development for current and new goods and services.
- Emphasizing product quality and quality control in manufacturing and distribution processes.
- Emphasizing customer service and support through local distribution networks.
- Leveraging the financial resources traditionally only available to companies in developed countries to adopt global strategies such as, for instance, reaching consumers in both developed and developing markets with products that are appropriately targeted in each market, and producing in both developed and developing countries, shifting tasks as appropriate across markets to those that involve more or less value added and that may be performed by more or less skilled workforces.

Companies operating across countries may routinely buy inputs in several countries, ship them to other countries where they are combined, ship them to yet other countries where final products are assembled, and ship them yet again to be sold in other countries. While a company may view the flow of inputs across countries as an integral process, the tax (and international trade tariff) laws of each country may require **prices** to be assigned to those inputs when the subsidiary of a company in one country ships or **transfers** them to another subsidiary of the same company in another country. The practices that companies follow to assign such prices are called **transfer pricing.**

Transfer prices are relevant for tax calculations as companies may be taxed in each country based on the difference between what they paid for inputs and the transfer prices they assigned to those inputs upon shipping them to other company subsidiaries abroad. Determining some transfer prices is straightforward, as in the case of standardized basic inputs that are commonly bought and sold (e.g., a certain type of wheat). Many other inputs, however, are not standardized as they may be specific parts of final products for which there are no independent markets (e.g., the undercarriage for a specific model of a car from a particular brand). Companies and tax authorities may disagree on companies' transfer pricing practices, as tax authorities may suspect companies of increasing the transfer prices of inputs shipped from lower tax jurisdictions to high tax jurisdictions, thereby increasing the share of profits taxed at low rates and decreasing the share taxed at high rates.

Lecture 1.17 – Economics – Class Question – DRS

Durable, Inc., is an auto parts manufacturer with many experienced employees. Durable has three product lines: contract parts, high-performance parts, and bargain parts.

Major automobile manufacturers contract parts for Durable to supply parts for their production lines and dealerships. Durable competes with in-house shops as well as other independent contractors for these contracts and basically is a price taker in this market. The contract product line is made of parts patented by the automobile manufacturers. Durable makes these products to the manufacturers' specifications. The manufacturers sell these parts under their own labels. While the manufacturers guarantee these parts to their customers, a system of serial numbers allows these parts to be traced to the manufacturing plant and Durable is liable to manufacturers if failures exceed maximums set by the contracts.

Durable also supplies parts to which it holds the patents to distributors for independent garages to install and retailers to sell to consumers to install in their own vehicles. Durable has a high-performance line and a bargain line in the retail market. In the retail market, Durable has more influence on these prices than in the contract work for automobile manufacturers. The high-performance parts are guaranteed for a longer life and retail for more than the contract parts. The bargain parts are guaranteed for a shorter life and retail for less than the contract parts. The margins on the retail market sales are higher than the sales of the contract product line, but demand is significantly smaller. There are few sellers in the retail auto parts market and these rivals are aware of each other's actions.

Durable's Michigan plant concentrates on steel parts. Durable's Tennessee plant concentrates on parts that are mostly fiber, such as filters. Durable's Utah plant concentrates on parts that are mostly rubber, such as hoses and gaskets. The vast majority of Durable's sales occur within the United States.

Durable is planning to acquire 100% of Flexible Manufacturing, LLC. Flexible was founded six years ago by young materials scientists to take advantage of the high-performance aspects of silicone. Flexible makes silicone parts for plumbing applications and appliances, such as washing machines and heat pumps. Flexible's products are made to both metric and Imperial sizes and ship worldwide. While a little more expensive, these parts are considerably more durable than comparable rubber parts. Durable plans to retain Flexible's existing product lines and to use Flexible's expertise in developing silicone auto parts. Neither the automobile manufacturers nor Durable's rivals currently manufacture, or have announced plans to manufacture, silicone auto parts. The acquisition will involve both cash and stock paid to Flexible's members along with stock options for Flexible's key technicians and sales staff. As envisioned, the acquisition will be 5% cash and 95% Durable's common stock.

Based on the previous year's audit file and preliminary discussions with Durable's management, an intern developed the following draft analysis of Durable's operating environment in preparation for interim work on the annual audit.

Amend the draft as appropriate. Any information contained in an item is unique to that item and is not to be incorporated when answering other items.

To revise the document, click on each segment of underlined text below and select the needed correction, if any, from the list provided. If the underlined text is already correct in the context of the document, select "original text." If none of the statements are appropriate in the context of the document, select "delete text."

To: Adrian Cutt, Audit Team Leader
From: Ben Paste, Staff
Re: Preliminary Analysis of Durable's Operating Environment
Date: June 25, Year 2

1. Average credit card debt held by U.S. consumers increased 4% from a year ago. This probably will have no significant effect on the economy as a whole and no effect on Durable's bargain product line sales.
2. The national average duration of employment increased 4 weeks from a year ago. This probably will have no significant effect on the economy as a whole and no effect on Durable's high-performance product line sales.
3. Nationwide, there is a 10% increase in residential building permits over the previous year. This probably will have no significant effect on the economy as a whole and no effect on Durable's contract sales.
4. Reliable, a competitor in the retail auto parts sales market responsible for about 9% of market revenues, is undergoing liquidation due to management embezzlement uncovered in January. This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales.
5. Viewership of "Carz @ Home," a cable TV show for the non-mechanically inclined car owner, has risen 25% in the past year. This show illustrates simple maintenance and enhancement tasks and encourages novices to work on their vehicles. This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales units.
6. One significant business reason for the acquisition of Flexible Manufacturing is gaining the means to manage hypercompetition.
7. Another significant business reason for the acquisition of Flexible Manufacturing is to take advantage of increased efficiencies in communication.

Items for Analysis

This probably will have no significant effect on the economy as a whole and no effect on Durable's bargain product line sales.

Average credit card debt held by U.S. consumers increased 4% from a year ago.

1. Choose an option below:

- [Original text] This probably will have no significant effect on the economy as a whole and no effect on Durable's bargain product line sales.
- [Delete text.]
- This probably will have no significant effect on the economy as a whole and decrease Durable's bargain product line sales.
- This probably will have no significant effect on the economy as a whole and increase Durable's bargain product line sales.

- This probably will have a contracting effect on the economy as a whole and no effect on Durable's bargain product line sales.
- This probably will have a contracting effect on the economy as a whole and decrease Durable's bargain product line sales.
- This probably will have a contracting effect on the economy as a whole and increase Durable's bargain product line sales.
- This probably will have an expansive effect on the economy as a whole and no effect on Durable's bargain product line sales.
- This probably will have an expansive effect on the economy as a whole and decrease Durable's bargain product line sales.
- This probably will have an expansive effect on the economy as a whole and increase Durable's bargain product line sales.

This probably will have no significant effect on the economy as a whole and no effect on Durable's high-performance product line sales.

The national average duration of employment increased 4 weeks from a year ago.

2. Choose an option below:

- [Original text] This probably will have no significant effect on the economy as a whole and no effect on Durable's high-performance product line sales.
- [Delete text.]
- This probably will have no significant effect on the economy as a whole and decrease Durable's high-performance product line sales.
- This probably will have no significant effect on the economy as a whole and increase Durable's high-performance product line sales.
- This probably will have a contracting effect on the economy as a whole and no effect on Durable's high-performance product line sales.
- This probably will have a contracting effect on the economy as a whole and decrease Durable's high-performance product line sales.
- This probably will have a contracting effect on the economy as a whole and increase Durable's high-performance product line sales.
- This probably will have an expansive effect on the economy as a whole and no effect on Durable's high-performance product line sales.
- This probably will have an expansive effect on the economy as a whole and decrease Durable's high-performance product line sales.
- This probably will have an expansive effect on the economy as a whole and increase Durable's high-performance product line sales.

This probably will have no significant effect on the economy as a whole and no effect on Durable's contract sales.

Nationwide, there is a 10% increase in residential building permits over the previous year.

3. Choose an option below:

- [Original text] This probably will have no significant effect on the economy as a whole and no effect on Durable's contract sales.
- [Delete text.]

- This probably will have no significant effect on the economy as a whole and decrease Durable's contract sales.
- This probably will have no significant effect on the economy as a whole and increase Durable's contract sales.
- This probably will have a contracting effect on the economy as a whole and no effect on Durable's contract sales.
- This probably will have a contracting effect on the economy as a whole and decrease Durable's contract sales.
- This probably will have a contracting effect on the economy as a whole and increase Durable's contract sales.
- This probably will have an expansive effect on the economy as a whole and no effect on Durable's contract sales.
- This probably will have an expansive effect on the economy as a whole and decrease Durable's contract sales.
- This probably will have an expansive effect on the economy as a whole and increase Durable's contract sales.

This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales.

Reliable, a competitor in the retail auto parts sales market responsible for about 9% of market revenues, is undergoing liquidation due to management embezzlement uncovered in January.

4. Choose an option below:

- [Original text] This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales.
- [Delete text.]
- This probably will have no significant effect on the economy as a whole and decrease Durable's retail market sales.
- This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales.
- This probably will have a contracting effect on the economy as a whole and no effect on Durable's retail market sales.
- This probably will have a contracting effect on the economy as a whole and decrease Durable's retail market sales.
- This probably will have a contracting effect on the economy as a whole and increase Durable's retail market sales.
- This probably will have an expansive effect on the economy as a whole and no effect on Durable's retail market sales.
- This probably will have an expansive effect on the economy as a whole and decrease Durable's retail market sales.
- This probably will have an expansive effect on the economy as a whole and increase Durable's retail market sales.

This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales units.

Viewership of "Carz @ Home" a cable TV show for the non-mechanically inclined car owner has risen 25% in the past year. This show illustrates simple maintenance and enhancement tasks and encourages novices to work on their vehicles.

5. Choose an option below:

- [Original text] This probably will have no significant effect on the economy as a whole and no effect on Durable's retail market sales units.
- [Delete text.]
- This probably will have no significant effect on the economy as a whole and decrease Durable's retail market sales units.
- This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales units.
- This probably will have a contracting effect on the economy as a whole and no effect on Durable's retail market sales units.
- This probably will have a contracting effect on the economy as a whole and decrease Durable's retail market sales units.
- This probably will have a contracting effect on the economy as a whole and increase Durable's retail market sales units.
- This probably will have an expansive effect on the economy as a whole and no effect on Durable's retail market sales units.
- This probably will have an expansive effect on the economy as a whole and decrease Durable's retail market sales units.
- This probably will have an expansive effect on the economy as a whole and increase Durable's retail market sales units.

One significant business reason for the acquisition of Flexible Manufacturing is gaining the means to manage hypercompetition.

One significant business reason for the acquisition of Flexible Manufacturing is….

6. Choose an option below:

- [Original text] One significant business reason for the acquisition of Flexible Manufacturing is gaining the means to manage hypercompetition.
- [Delete text.]
- One significant business reason for the acquisition of Flexible Manufacturing is gaining the means for mass customization.
- One significant business reason for the acquisition of Flexible Manufacturing is to increase technological innovation.
- One significant business reason for the acquisition of Flexible Manufacturing is to increase workforce diversity.
- One significant business reason for the acquisition of Flexible Manufacturing is to increase equity financing.
- One significant business reason for the acquisition of Flexible Manufacturing is to increase debt financing.

Another significant business reason for the acquisition of Flexible Manufacturing is to take advantage of increased efficiencies in communication.

7. Choose an option below:

- [Original text] Another significant business reason for the acquisition of Flexible Manufacturing is to take advantage of increased efficiencies in communication.
- [Delete text.]
- Another significant business reason for the acquisition of Flexible Manufacturing is to appeal to customers with a heighted environmental awareness.
- Another significant business reason for the acquisition of Flexible Manufacturing is to diversify the markets that Durable serves.
- Another significant business reason for the acquisition of Flexible Manufacturing is to enhance quality measures.
- Another significant business reason for the acquisition of Flexible Manufacturing is to decrease equity financing.

Document Review Simulation Solution 1

To: Adrian Cutt, Audit Team Leader
From: Ben Paste, Staff
Re: Preliminary Analysis of Durable's Operating Environment
Date: June 25, Year 2

1. Average credit card debt held by U.S. consumers increased 4% from a year ago. This probably will have a contracting effect on the economy as a whole and increase Durable's bargain product line sales.

2. The national average duration of employment increased 4 weeks from a year ago. This probably will have an expansive effect on the economy as a whole on the economy as a whole and increase Durable's high-performance product line sales.

3. Nationwide, there is a 10% increase in residential building permits over the previous year. This probably will have an expansive effect on the economy as a whole on the economy as a whole and increase Durable's contract sales.

4. Reliable, a competitor in the retail auto parts sales market responsible for about 9% of market revenues, is undergoing liquidation due to management embezzlement uncovered in January. This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales.

5. Viewership of "Carz @ Home," a cable TV show for the non-mechanically inclined car owner, has risen 25% in the past year. This show illustrates simple maintenance and enhancement tasks and encourages novices to work on their vehicles. This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales units.

6. One significant business reason for the acquisition of Flexible Manufacturing is to increase technological innovation.

7. Another significant business reason for the acquisition of Flexible Manufacturing is to diversify the markets that Durable serves.

Explanations

1. **This probably will have a contracting effect on the economy as a whole and increase Durable's bargain product line sales.**

   As debt levels rise, consumers tend to rein in purchases; this tends to have a contracting effect on the economy as a whole. Durable's bargain parts may be considered inferior goods, as opposed to normal goods. During a recession, many consumers experience lower income. Consumers experiencing lower income will purchase more inferior goods than when experiencing growing income. In other words, consumers will purchase more "bargain parts" as opposed to the higher-priced high-performance or "genuine factory" parts. [other answers] As debt levels rise, consumers tend to rein in purchases; this tends to have a contracting effect on the economy as opposed to an expansive or no effect. An expansion would tend to decrease Durable's bargain product line sales. Stability in the economy as a whole would tend to result in Durable's bargain product line sales remaining constant.
   This probably will have an expansive effect on the economy as a whole and increase Durable's high-performance product line sales.

   The average duration of employment, in weeks, is a common trailing indicator of business cycle changes. An increase in this duration signifies a recovery or expansion in the economy as a whole. Durable's high-performance parts may be considered normal goods; during a recovery, more people will be experiencing growing income. Consumers with increased income spend more on normal goods (Durable's high-performance parts). [other answers] A decrease in this duration signifies a contraction in the economy as a whole; sales of normal goods generally contract during such a period. No change in this duration signifies a stable economy; sales of normal goods generally remain constant during such a period.

3. **This probably will have an expansive effect on the economy as a whole and increase Durable's contract sales.**

   An increase in housing permits indicates that residential construction soon will increase, fueling demand for household furnishings as well as construction materials. This generally heralds an expansive period (rather than a recessionary or stable period) as the ripple effect works its way through the economy as a whole. Auto manufacturers will want to have inventory ready for when people not building homes, but feeling more confident about the economy, are ready to buy new vehicles. Thus, Durable's contract sales likely would increase, rather than decrease or remain stable.

4. **This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales.**

   The liquidation of one competitor in the retail auto parts market probably will not have a significant impact on the economy as a whole. Durable's sales may increase as the sudden absence of one competitor in the retail auto parts market is an opportunity for Durable to gain market share. [other answers] The retail auto parts market does not exert sufficient influence over wider markets to inflate expectations in the economy as a whole before the embezzlement is uncovered or for the embezzlement discovery to undermine confidence in the economy as a whole. It is unlikely that Durable's sales would decrease due to embezzlement at a competitor. While it is possible that embezzlement at a competitor would have no effect on Durable's retail market sales, it is more likely that Durable's sales would increase.

5. This probably will have no significant effect on the economy as a whole and increase Durable's retail market sales units.

The increase of do-it-yourselfers (DIYs) in the retail auto parts market probably will not have a significant impact on the economy as a whole. The increase of DIYs will increase the quantity demanded at the retailers where Durable's retail market lines are sold. [other answers] The retail auto parts market does not exert sufficient influence over ancillary markets for this event to undermine or boost confidence. The increased sales of parts to DIYs will be offset by reduced sales to garages and dealerships. The mechanics who formerly would have been hired to repair and maintain vehicles are unlikely to suffer so much unemployment that it would start a downward spiral in other employment fields. Further, any reduction in hours is dissipated, unlike a factory closing that potentially could shut down a town. The increase of DIYs would not decrease the quantity demanded of Durable's retail market products. While it is possible that the increase of DIYs would have no effect on Durable's retail market sales quantity, it is more likely that Durable's sales quantity would increase.

6. One significant business reason for the acquisition of Flexible Manufacturing is to increase technological innovation.

Flexible has experience with a material that Durable does not currently use. Durable plans to use that expertise to develop new products for its current markets and diversify the company. [other answers] The scenario does not indicate that the industry is undergoing hypercompetition. There is no mention that Flexible customizes product from a set of standard components, adapted to each consumer's specifications, as is the case with mass customization. Age diversity is implied by this acquisition; there is no indication that any other type of diversity in the workforce will increase when these two entities combine. Given the scenario, there is a better response available than workforce diversity. Also, if the goal was simply increased workforce diversity, Durable could accomplish this goal merely by changing its employment practices. Increased equity financing is the means by which the acquisition of Flexible will be accomplished, but not the reason for the acquisition. As envisioned, the acquisition will be 5% cash and 95% common stock; no debt financing is mentioned.

7. Another significant business reason for the acquisition of Flexible Manufacturing is to diversify the markets that Durable serves.

Flexible currently serves the plumbing and appliance markets, not auto manufacturers or auto parts consumers; Durable acquires a presence in these markets when it purchases Flexible. [other answers] There is no indication that Flexible is any better at communications than Durable. There is no indication that Flexible has any particular environmental credentials. There is no indication that Flexible is any better at quality control than Durable. As envisioned, the acquisition will be 5% cash and 95% common stock; this would increase equity financing, not reduce it.

Corporate Governance, Internal Control & Enterprise Risk Management

Lecture 2.01 – Corporate Governance: Board of Directors

Corporate Governance Overview

Corporations have many stakeholders, including stockholders, who may be the most obvious, but also including customers, suppliers, employees, regulators, and the communities that are affected by the entity's operations or activities. It is the role of corporate governance to make certain that the objectives of the entity are met while the legitimate needs and concerns of all stakeholders are being addressed.

Corporate governance consists of the systems that are applied to control and to direct a corporation. Those responsible for governance will depend largely on the size and nature of the entity. In a small organization, governance may be the responsibility of owner-managers. In larger organizations, however, the responsibility for governance is disbursed among a variety of individuals in a somewhat more structured environment.

In the case of most publicly-held companies, for example, stockholders, the owners of the entity, are not directly involved in its operations. They, instead, elect a board of directors who in turn are responsible for strategic planning as well as for the selection and oversight of the entity's management. The board of directors will use various forms of **compensation** to incentivize managers to perform their responsibilities to the best of their abilities. The board will also use various means of **monitoring management** to make certain that its decisions are consistent with achieving the entity's objectives.

There have been numerous studies on corporate governance and it is an area that is subject to a significant amount of legislation, including the Sarbanes-Oxley Act (SOX). In many respects, SOX is an attempt to legislate principles that were included in 2 significant earlier reports related to corporate governance. These include the 1992 Cadbury Report and the Principles of Corporate Governance, originally published by the Organization for Economic Co-Operation and Development (OECD) in 1998 and re-written in 2004.

The Cadbury report suggested a voluntary code for corporate governance. Companies listed on the London stock exchange are required to comply or explain the extent to which they do comply, the areas where they do not, and the reasons for any noncompliance. Some of the principles of the Cadbury report include:

- There should be a clear division of responsibility at the top, primarily that the position of chairman of the board be separated from that of Chief Executive, or there should be a strong independent element on the board.
- The majority of the Board members should be outside directors.
- Remuneration of Board members should be determined by non-executive directors.
- The Board should select an audit committee that includes at least 3 non-executive directors.

The Organization for Economic Co-Operation and Development (OECD), an international organization, developed the OECD Principles of Corporate Governance. It developed principles in 6 key areas:

- **Effective Corporate Governance Framework** – "The corporate governance framework should promote transparent and efficient markets, be consistent with the rule of law and clearly articulate the division of responsibilities among different supervisory, regulatory and enforcement agencies."
- **Shareholder Rights and Ownership Functions** – "The corporate governance framework should protect and facilitate the exercise of shareholders' rights."
- **Equitable Treatment of Shareholders** – "The corporate governance framework should ensure the equitable treatment of all shareholders, including minority and foreign shareholders. All shareholders should have the opportunity to obtain effective redress for violation of their rights."
- **Stakeholders' Role in Corporate Governance** – "The corporate governance framework should recognize the rights of stakeholders established by law or through mutual agreements and encourage either active co-operation between corporations and stakeholders in creating wealth, jobs, and the sustainability of financially sound enterprises."
- **Disclosure and Transparency** – "The corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company."
- **Board Responsibilities** – "The corporate governance framework should ensure the strategic guidance of the company, effective monitoring of management by the board, and the board's accountability to the company and the shareholders."

Board of Directors

A Board of Directors (BOD) gets its responsibilities and authority from an authority outside of itself. Upon formation, a corporation will file **articles of incorporation** (corporate Charter when approved), with the secretary of state and create bylaws. The articles will include such information as the name of the company, its address at the time of filing, and its purpose, the name of the registered agent of the corporation, name and address of each incorporator and the number of authorized shares of stock and types of stock. The **bylaws** (internal rules of the corporation), generally indicate the minimum and maximum number of directors, how they are to be selected and compensated, how often they are to meet, and the nature of their responsibilities. The typical **duties of a board of directors** include:

- The board members have a **fiduciary duty** to:
    - ***Act loyally*** and in the best interest of the corporation and shareholders, which includes not putting their interests above the company's and acting without personal economic conflict.
    - ***Act with a Duty of Care*** and be diligent when making company decisions.
    - ***Act with Due Diligence,*** which means using reasonable care when entering into agreements or transactions with another party.
- Determining or revising the entity's mission and amending its bylaws
- Strategic planning and the development of broad objectives and policies
- Selection and oversight of the chief executive
- Securing the availability of financial resources
- Budget approval, and approval of major operating and financial proposals

- Accounting to stakeholders, including making certain that reliable financial information is reported by the entity
- Providing advice to management and determining its compensation
- Establishing dividend policies
- Reacquiring treasury stock

The New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) have established **requirements related to the boards of directors of listed companies**. These include:

- The majority of directors are required to be independent and information must be provided to investor's regarding director independence.
- A director is *not independent if* they were recently an employee or affiliate of the entity, a former partner or employee of the external auditor, or if a family member was recently an officer of the entity (5 years for NYSE, 3 years for NASDAQ); if the director or a family member received more than $120,000 from the corporation, excluding director fees, for any 12-month period within the last 3 years; or if the director is an executive of another entity that receives significant amounts of revenue from the entity.
- Non-management directors are required to meet on a regularly scheduled basis.
- The directors must adopt and publish a code of conduct that is applicable to all parties within the entity, including directors, officers, and employees, disclosing any waivers to directors or officers.
- The entity must maintain an independent audit committee.
- The entity must identify relationships that automatically indicate that a director is not independent.

A director has some protection against liability when decisions do not provide the anticipated results. The **business judgment rule** was established as a result of case law and it requires a director to fulfill a **fiduciary duty** to the entity by acting in good faith, being loyal, and applying due care. When they do so, the courts will not review their business decisions regardless of the outcome. In general, directors will not be liable for their decisions unless they are guilty of fraud.

For example, if directors reasonably rely on information showing that dividends may be declared and declare such dividends when, in fact, the corporation was insolvent, the directors will not be held liable for the illegal dividends. (The shareholders will have to repay the dividends if the corporation was insolvent when the dividends were declared.)

Boards of directors will **establish various committees** in order to disburse the board's responsibilities. Johnson & Johnson, a U.S. publicly-held company, for example, has 6 committees that are part of its board, including:

- Audit
- Compensation & Benefits
- Nominating & Corporate Governance
- Finance
- Regulatory, Compliance & Government Affairs
- Science, Technology & Sustainability

Pepsi's board, on the other hand, has 3 committees:

- Nominating and Corporate Governance
- Audit
- Compensation

In some cases, committees are required to be made up of independent, or **outside directors**. These are directors who have no involvement with the entity other than in their capacity as a director. An **inside director**, on the other hand, has some significant involvement in the entity, often as a member of management, in addition to being a director. Some entities will apply the term **executive director** exclusively to the chief executive officer (CEO), while others will apply it to any director who is also an executive, or officer, of the corporation.

There are **three committees** that a publicly-held company is required to maintain. These are the nominating committee, the audit committee, and the compensation committee.

The **nominating committee** is responsible for the overall corporate governance of an organization. The primary duty of the nominating committee is to determine who is suitable for service on the board of directors. It is charged with developing and suggesting governance principles and policies to the board, overseeing CEO succession, enhancing the quality of nominees to the board, and making certain of the integrity of the nominating process.

The Wall Street Reform and Consumer Protection Act, referred to as **Dodd-Frank**, requires an entity to disclose whether or not the chair of the board of directors is also the chief executive officer. The entity is also required to indicate the reasons why they are, or are not, the same individual.

The **audit committee** has a variety of responsibilities. Under Sarbanes-Oxley Act (**SOX**) Title IV, the audit committee is required to be made up of independent directors and at least one member of the audit committee is required to be a financial expert or, if there is none on the audit committee, the *reasons* the audit committee does not include at least one. A **financial expert** has:

- An understanding of GAAP and financial statements
- Experience preparing or auditing comparable financial statements and experience in applying financial statement or audit knowledge to the accounting for estimates, accruals, and reserves
- Experience with internal accounting controls
- An understanding of the functions of the audit committee
    - Need not be a CPA

Under SOX Title III, the audit committee is responsible for overseeing the financial reporting process. It is to make certain that reliable information that is useful to stakeholders is available on a timely basis. The audit committee is responsible for the appointment, compensation, and oversight of the entity's auditors, who are to report directly to the audit committee.

In addition, the audit committee has several responsibilities related to the entity's **internal controls** under section 404 Title IV of SOX. It is required to oversee the establishment of appropriate controls, including programs for the prevention and detection of fraud. It is responsible for maintaining a code of ethics for senior financial officers and making it publicly available (SOX Title IV) and is also required to establish procedures for **dealing** with complaints about accounting, internal control, or audit matters, and to facilitate a process for employees to anonymously and confidentially express concerns about accounting related issues (**whistleblowers**).

Section 906 of SOX requires the CEO and CFO to certify that the reports filed with the SEC (10Q, 10K) comply with relevant securities laws and also fairly present the financial condition and results of operations of the company. If they are found criminally liable for certifying false and defective

financial statements, they could be imprisoned for 10 to 20 years and fined from $1 million to $5 million.

The **compensation committee**, made up of independent directors, is responsible for establishing compensation policies for directors and executives of the corporation. It is charged with making certain that their policies are both appropriate and supportable and that they are consistent with the mission and objectives of the entity.

Because of the significance of the compensation committee, it has been subjected to various forms of regulation. The SEC, the NYSE, and the NASDAQ all require the compensation committee to assume certain **responsibilities** that include:

- Developing a compensation approach or philosophy
- Establishing compensation for the CEO and other executive officers
- Use outside experts, as appropriate
- Receive and evaluate proposals regarding executive compensation put forth by shareholders

Although the **Dodd-Frank Act** was designed to regulate the financial services industry, there are 4 significant provisions that directly relate to the *compensation committee* of the board of directors.

- **Say-on-Pay** – Stockholders are required to be allowed to determine, by vote, if they approve of the compensation of executive officers; whether the vote on compensation should occur every 1, 2, or 3 years; and, in the event of a merger, whether or not they approve any compensation related to a "Golden Parachute." The votes on executive compensation and "Golden Parachute" compensation are not, however, binding on the board of directors.
- **Independence** – Committee members and advisers are required to adhere to a higher standard in determining whether or not they are sufficiently independent to serve on, or advice to, the compensation committee. The bill also calls for enhanced disclosure regarding the use of compensation consultants and any conflicts of interest.
- **Disclosure** – The bill requires enhanced disclosure relating executive compensation to the entity's financial performance. Disclosure includes the relationship of the median employee compensation, excluding that of the CEO, to the total annual compensation of the CEO.
- **Claw backs** – The bill requires an entity that is required to restate its financial statements to establish policies for the recoupment of compensation (SOX Title III).

Executive Oversight

One of the most significant responsibilities of the board of directors is the oversight of management. The board meets this responsibility through its management compensation policies and through monitoring of management.

Management compensation policies require the board to find a balance between different forms of compensation that may, on one hand, motivate management to strive to perform at the utmost level or may, on the other, cause management to find ways to maximize their own compensation at the detriment of, or at least without considering benefit to, the entity.

- If the compensation package includes too high a proportion of fixed compensation and too low a proportion of incentive compensation, management will not have incentives to take risks that may be appropriate and necessary for the achievement of the entity's objectives.
- If the opposite is true, it may provide management with the incentive to take risks that are not consistent with the entity's risk appetite. As a result, the combination of fixed and incentive compensation should be carefully evaluated.

Fixed compensation generally consists of the officer's salary and perquisites (perks). Perks may include such items as a company automobile or access to a company plane or limousine, health and life insurance, and retirement benefits.

Incentive compensation can be provided in a wide variety of forms. Some of the most common include:

- *Bonuses* – In most cases, bonuses are based on some version of accounting profit. While this rewards management for good entity performance, it is often easy to manipulate profits in the short run by deferring or accelerating expenses or revenues, through capitalization and depreciation policies, and various other means.
- *Share based compensation* – This includes such items as stock options, shared appreciation rights, restricted shares, and performance shares.
    - *Stock options* give the officer the ability to buy shares at a fixed price for a specific period of time. Although this clearly ties compensation to performance, it may cause management to focus too heavily on short-term stock price rather than long-term objectives. In addition, a decline in price may make it appear that the option will never be "in the money" (where the stock price exceeds the option price), negating any incentive.
    - *Shared appreciation rights* operate similarly to stock options with the same advantages and disadvantages. The additional advantage to officers is that it provides them with cash payments resulting from increases in the stock price rather than the opportunity to buy shares at a potential bargain.
    - *Restricted shares* are shares of stock that may not be disposed of for a specified period of time. This provides the advantage that the officer does not have to pay for shares and gives management an incentive to strive to increase the stock price, at least during the period of restriction. Clearly, the longer the restriction, the greater the potential for benefit to the entity.
    - *Performance shares* are shares that are issued to management if specific performance objectives are met. These are potentially very effective to encourage management to concentrate on the meeting of specific performance objectives.

Lecture 2.02 – Corporate Governance: Internal Audit Function

There are various ways in which the board of directors can **monitor management**. One of the most common, and often the most effective, is through the use of internal auditors. When internal auditors report directly to the audit committee of the board of directors, they are more likely to be effective in helping the board monitor the performance of management, largely because the audit committee is made up exclusively of independent directors.

According to requirements of the NYSE, "Listed companies must maintain an **internal audit function** to provide management and the audit committee with ongoing assessments of the company's risk management process and system of internal control." Many large companies will have a chief auditing executive (CAE) who will report to the audit committee and who will be responsible for the internal audit function within the entity.

The Institute of Internal Auditors (IIA), an international professional association that many internal auditors belong to, has developed an International Professional Practices Framework (IPPF) that consists of three components:

1. The definition of internal auditing
2. The code of ethics
3. International Standards for the Professional Practice of Internal Auditing (ISPPIA)

1. The IIA provides the following ***definition of internal auditing***:

> "Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and government processes."

2. The IIA's ***code of ethics*** identifies the principles that internal auditors are expected to uphold and the rules of conduct that they are expected to follow.

- Principles
    - Integrity
    - Objectivity
    - Confidentiality
    - Competency
- Rules
    - Integrity
        - Honesty, diligence, and responsibility
        - Observation of the law, including providing disclosures expected by the law and the profession
        - Not knowingly engaging in illegal acts or acts discreditable to the profession or the organization
        - Respect for, and contribution to, ethical objectives of the organization
    - Objectivity
        - Not participating in activities or relationships that may impair objectivity or be in conflict with the organization's interests
        - Not accepting anything that might impair professional judgment

        - Disclosing all material relevant facts that are known
    - Confidentiality
        - Exercising prudence in use and protection of information acquired through performance of responsibilities
        - Not using information for personal gain, in a manner contrary to the law, or detrimental to the appropriate objectives of the organization
    - Competency
        - Engaging only in services for which they are qualified
        - Performing internal audit services in accordance with ISPPIA
        - Continually improving proficiency and quality of service

3. ***ISPPIA*** are designated as attribute standards and performance standards.

- **Attribute Standards** fall into 4 categories
    - Purpose, Authority, and Responsibility
        - Recognition of the Definition of Internal Auditing, the Code of Ethics, and the Standards in the Internal Audit Charter
    - Independence and Objectivity
        - Organizational Independence
        - Direct Interaction with the Board
        - Individual Objectivity
    - Proficiency and Due Professional Care
        - Proficiency
        - Due Professional Care
        - Continuing Professional Education
    - Quality Assurance and Improvement Program
        - Requirements of the Quality Assurance and Improvement Program
        - Internal Assessments
        - External Assessments
        - Reporting on the Quality Assurance and Improvement Program
        - Use of "Conforms with the International Standards for the Professional Practice of Internal Auditing"
        - Disclosure of Nonconformance
- **Performance Standards** fall into 7 categories
    - Managing the Internal Audit Activity
        - Planning
        - Communication and Approval
        - Resource Management
        - Policies and Procedures
        - Coordination
        - Reporting to Senior Management and the Board
        - External Service Provider and Organizational Responsibility for Internal Auditing
    - Nature of Work
        - Governance
        - Risk Management
        - Control
    - Engagement Planning
        - Planning Considerations
        - Engagement Objectives
        - Engagement Scope

        - Engagement Resource Allocation
        - Engagement Work Program
    - Performing the Engagement
        - Identifying Information
        - Analysis and Evaluation
        - Documenting Information
        - Engagement Supervision
    - Communicating Results
        - Criteria for Communicating
        - Quality of Communications
        - Errors and Omissions
        - Use of "Conducted in Conformance with the International Standards for the Professional Practice of Internal Auditing"
        - Engagement Disclosure of Nonconformance
        - Disseminating Results
        - Overall Opinions
    - Monitoring Progress
    - Communicating the Acceptance of Risks

External Auditors

In addition to internal auditors, **external auditors** are potentially effective in contributing to the monitoring of management. SOX requires the external auditor to be a public accounting firm that is registered with the Public Company Accounting Oversight Board (PCAOB) and establishes very strict rules as to the independence of the external auditors, including a prohibition against the performance of many nonaudit services, a requirement that any nonattest services performed by the auditor be preapproved by the audit committee, and audit partner rotation.

As part of their monitoring role, the independent external auditor is required **to communicate** with the ***auditing committee*** regarding:

- Critical accounting policies and practices being used.
- Alternative treatments, acceptable under GAAP, that have been discussed with management, including implications of such treatment and the public accounting firm's preference.
- Any additional written communications with management, including any management letter or schedule of unadjusted differences.

In addition to performing an audit of the entity's financial statements, the external auditor has responsibilities in relation to the entity's **internal control**. Section 404 of Title IV of SOX, "Management Assessment of Internal Controls," requires management to provide, with each annual report, a report on internal control indicating management's responsibility for establishing and maintaining adequate controls and assessing the effectiveness of controls as of the end of the most recent fiscal period. The registered independent accounting firm is required to attest to (Opinion), and report on, management's assessment. This is the result of an examination of internal control that is **integrated** with the audit of the financial statements.

Under SOX a CEO or CFO who misrepresents financial information may be both imprisoned and fined. The penalties could range from $1 million and 10 years to $5 million and 20 years in prison.

Generally accepted auditing standards (GAAS) require the external auditor to **communicate with those *charged with governance*** regarding certain matters. These include:

- The auditor's responsibility to form and express an opinion on the financial statements, which does not relieve those charged with governance of any responsibilities
- The planned scope and timing of the audit
- The auditor's view about qualitative aspects of the entity's accounting practices, including policies, estimates, and disclosures
    - Why, if applicable, a practice acceptable under GAAP is not appropriate under the circumstances
    - Determining that those responsible for governance are informed about the process used in formulating estimates and the auditor's conclusions about their reasonableness.
- Significant difficulties, disagreements with management, and other findings or issues, if any.
- Uncorrected mistakes, along with their effects, accumulated by the auditor as well as the effect of uncorrected misstates from prior periods.

In some cases, all of those charged with governance are also involved in management. When that is not the case, the auditor is required to communicate additional matters to those charged with governance.

- Material corrected mistakes brought to management's attention
- Significant findings or issues discussed with management
- Auditor views on matters that were the subject of management consultation with other accountants
- Written representations requested by the auditor

Other Monitoring Devices

There are several other means by which management is monitored:

- The company will be scrutinized by various members of the investment community, including **investment banks** and **securities analysts**, who use information about the company to make their decisions or recommendations as to the purchase or sale of its securities.
- **Creditors** and **credit agencies** make similar analyses and monitor compliance with debt covenants, although they largely depend on management and external auditors for the information on which they base their decisions.
- **Attorneys** also monitor management when they are involved in securities filings, legal conflicts, or are engaged to advise management.

The **Securities and Exchange Commission** (SEC) is one of the more significant agencies responsible for monitoring management and enforcing the U.S. securities laws. In addition to its various components, which were initially established to protect investors, there have been several forms of legislation that have expanded the SEC's monitoring responsibilities. These include the SOX and the Dodd-Frank Act.

The SEC was originally created by the Securities and Exchange Act of 1934 as the result of a major fraud scheme perpetrated by the publicly-held company Kreuger and Toll. The SEC includes several components that are relevant to the monitoring of corporate governance. These include:

- The primary function of the **Division of Corporation Finance** is to provide interpretive guidance in regard to the Securities Act of 1933, the Securities and Exchange Act of 1934, the Trust Indenture Act of 1939, and the Sarbanes-Oxley Act of 2002. It also, however,

reviews filings made under the 1933 Act to evaluate compliance with disclosure and accounting requirements.

- The role of the **Division of Enforcement** is to investigate possible securities law violations. It recommends when the SEC should take action in a federal court, take action before an administrative law judge, or negotiate a settlement.
- The **Office of the Chief Accountant** is the component of the SEC that is responsible for the transparency and relevancy of financial reporting, for improving the professional performance of auditors of public companies, and for ensuring the fair presentation and credibility of financial statements used for investment decisions. It does so by establishing and enforcing accounting and auditing policy. Its three major groups are Accounting, Professional Practice, and International Affairs.

Other means of indirectly monitoring management performance include activities of the ***Internal Revenue Service*** (IRS), through the scrutiny of tax filings; ***shareholder actions***, which may involve replacing board members or filing class action lawsuits; and the potential for ***corporate takeovers***, which a corporation may make itself susceptible to as a result of ineffective management.

In 2012, the **JOBS** (Jumpstart Our Business Startups) **Act** was passed to encourage small business, specifically by making it easier for small business to participate in the capital markets (easier to go public, which in turn will create more jobs). It did so by extending the amount of time that certain new public companies will have to comply with certain requirements of the SOX. The entities are exempted from some provisions and compliance with others was extended by periods of 2 to 5 years.

The **JOBS Act** also:

- Increases the number of shareholders a company could have before being required to register its stock (1934 Act).
- Exempts certain small offerings from registration with the SEC (Reg A).
- Provides an exemption from some of the regulatory and disclosure requirements to certain companies with less than $1 billion in revenues before going public, or 5 years from the date they go public, referred to as emerging growth companies (EGC).
- Allows for general solicitation and advertising in certain types of private placements (Reg D, 506).
- Raises the limit for exemptions under Regulation A from $5 million to $50 million (Reg A).
- Raises the number of allowed shareholders of community banks from 500 to 2,000 (1934 Act).
- Prohibits crowdfunding of investment funds, which is the use of small amounts of money from a large number of investors to fund a venture.
- Exempt from the rules requiring shareholder vote on executive compensation.
- Not required to have audits of internal control (SOX 404).

Lecture 2.04 – Internal Controls

PCAOB Integrated Audit

AS 2201 (previously AS 5) requires the auditor to examine the design and operating effectiveness of internal control over financial reporting (ICFR) in order to provide a sufficient basis for an opinion on its effectiveness in preventing or detecting material misstatements of the financial statements. The results may be expressed in either separate reports or one combined report on the financial statements and the internal control over financial reporting. The financial statement audit portion of the integrated audit is similar to any other financial statement audit, but its "integrated" nature means that auditors rely much more on internal control and less on substantive procedures.

COSO's Internal Control Framework

The most commonly used framework to benchmark internal controls in the U.S. is *Internal Control – Integrated Framework* developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). COSO describes internal control as *"a process, effected by the entity's board of directors, management, and other personnel designed to provide reasonable assurance regarding the achievement of objectives relating to operations, reporting, and compliance."*

- Operational objectives relate to the effectiveness and efficiency of operations and incorporate the achievement of financial performance goals and the safeguarding of assets.
- Reporting objectives relate to the reliability, timeliness, and transparency of financial and nonfinancial reporting for both internal and external uses.
- Compliance objectives relate to complying with applicable laws and regulations.

Since internal control is a process that is affected by people, it can only provide reasonable assurance, as opposed to absolute assurance, that the entity's objectives will be met.

The COSO Board added the **17 Internal Control Principles** because they are presumed essential in assessing that the five components (CRIME) are present and functioning properly. Here are the 17 listed by internal control component (**CRIME**):

CONTROL *E*NVIRONMENT

1. Demonstrates commitment to integrity and ethical values
2. Exercises oversight responsibility
3. Establishes structure, authority, and responsibility
4. Demonstrates commitment to competence
5. Enforces accountability

***R*ISK ASSESSMENT**

6. Specifies suitable objectives
7. Identifies and analyzes risk
8. Assesses fraud risk
9. Identifies and analyzes significant change

***C*ONTROL ACTIVITIES**

10. Selects and develops control activities
11. Selects and develops general controls over technology
12. Deploys through policies and procedures

***I*NFORMATION & COMMUNICATION**

13. Uses relevant information
14. Communicates internally
15. Communicates externally

***M*ONITORING**

16. Conducts ongoing and/or separate evaluations
17. Evaluates and communicates deficiencies

Under COSO (The Committee of Sponsoring Organizations of the Treadway Commission) internal control includes the following **five components** which contain the 17 COSO Internal Control Principles mentioned above (**CRIME**):

The Control Environment

The control environment is the combination of standards, processes, and structures that enable internal control to be effective throughout the organization. Setting the tone of an organization by influencing the control consciousness of people, the control environment is the foundation of internal control. The control environment encompasses 5 principles.

a. Commitment to integrity and ethical values demonstrated through
    - The tone at the top established through the directives, actions, and behavior of management and governance
    - Standards of conduct understood by all members of the organization and others with which it interacts and against which behavior and performance is evaluated
    - Timely and consistent identification of and response to deviations from standards
    - COSO indicates that the control environment, or tone at the top, is the most significant internal control component when it comes to sending a message throughout the organization as to the entity's attitude about ethical behavior. It further indicates that this can best be demonstrated through the exemplary behavior of the leadership.

b. Governance's independence from management and oversight of internal control demonstrated through:
    - Identification and acceptance of oversight responsibilities
    - Inclusion of members with appropriate levels of skill and expertise to effectively oversee management with sufficient numbers independent of management and objective
    - Involvement in and oversight of internal control

c. Management's establishment of an appropriate hierarchy and structure to achieve entity objectives demonstrated through:
    - Establishment of reporting lines considering all structures of the entity
    - Assignment of, and limitations on, authorities and responsibilities

d. Commitment to attracting, developing, and retaining individuals who are competent and in accord with entity objectives demonstrated through:
    - Setting expectations requiring appropriate levels of competence
    - Evaluating competence and addressing deficiencies
    - Providing mentoring and training to attract, develop, and retain competent personnel and business relationships
    - Establishing contingency and succession plans

e. Individuals are held accountable for their control responsibilities, demonstrated through:
    - Establishment of mechanisms that hold individuals accountable for performance of internal control responsibilities including performance measures, incentives, and rewards, which are to be evaluated for relevance on an ongoing basis
    - Evaluation and moderation of pressures associated with performance
    - Evaluation of performance including rewards or remedial action, as appropriate

Factors of the control environment include (**CHOPPER**):

- ***C****ommitment to Competence* – Employees must possess the skills and knowledge essential to performing their jobs, especially those responsible for performing important control functions.
- ***H****uman resource policies and procedures* – Effective policies and practices for hiring, training, evaluating, counseling, promoting, and compensating employees are vital to the environment.
- ***O****rganizational structure* – Provides a basis for planning, directing and controlling operations.
- ***P****hilosophy and Operating style of Management* – The manner in which management runs the organization can have a significant effect on the control environment. Unethical management can lead to unethical employees.
- ***P****articipation of the Board of directors or audit committee* – Both groups play a key role in establishing IC.
- ***E****thical and Integrity values* – Management should encourage appropriate behavior and lead by example. Values are established through a code of conduct, official policies, and by example. This includes codes of conduct, the attestation process, whistle-blower processes, investigation and resolution, training and reinforcement both internally and with third parties.
- ***R****esponsibility and Authority Assignment* – Communicated through documents such as job descriptions and organizational charts; personnel need a clear understanding of their responsibilities and the rules and regulations that govern their actions.

Risk Assessment

Risk assessment refers to an entity's recognition of the fact that events may occur that pose risks to the achievement of the entity's objectives and the process that is established to identify and evaluate those risks. Risk assessment encompasses 4 principles.

a. Objectives are sufficiently clear to allow for identification and evaluation of risks to their achievement, demonstrated through:
    - Consideration of operational objectives, internal and external reporting objectives, and compliance objectives
    - Reflects management's choices in relation to operational objectives, and internal reporting objectives

b. Risks are identified and analyzed to determine appropriate management, demonstrated through:
    - Consideration of internal entity level risks, such as related to infrastructure, management structure, personnel, access to assets, and technology; and external entity level risks, such as related to the economy, the environment, regulation, foreign operations, and the social and technological environment.
    - Consideration of risks at the transaction level.
    - Consideration of factors such as likelihood of occurrence and its effect if it does; the speed with which the effect will be incurred upon occurrence of the event representing the risk; and the length of time the effect will last after occurrence of the event.
    - Consideration as to whether the appropriate response is accepting the risk by taking no preventive action; avoiding the risk by changing the objective or discontinuing the activity that creates the risk; sharing the risk by entering into a relationship, such as a joint venture, or participating in hedging activities; or reducing the risk through a variety of decisions, including the establishment of control activities.

c. Risk assessment includes a consideration of the possibility of fraud, demonstrated through:
    - Consideration of the nature of fraud, including the types of fraud that may be perpetrated against the entity.
    - Assessment of the characteristics of fraud, including incentives or pressures that may be inherent in the entity's activities; opportunities to commit or conceal fraud; and attitudes and rationalizations that may allow management or others to commit fraud.

d. The potential impact of changes within the entity on the effectiveness of internal control is identified and assessed, as demonstrated through:
    - Identification and assessment of changes in the external environment.
    - Identification and assessment of changes in the business model or the entity's leadership.

An entity's risk assessment for financial reporting purposes is its identification, analysis, and management of risks (risk response) relevant to the preparation of financial statements that are fairly presented in conformity with GAAP. Risk assessment includes risks that may affect an entity's ability to properly record, process, summarize, and report financial data. Risk assessment, for example, may address how the entity considers the possibility of unrecorded transactions or identifies and analyzes significant estimates recorded in the financial statements.

- Risks relevant to financial reporting include *external and internal* **factors** such as the following:
    - Changes in operating environment (competition)
    - New personnel
    - New or revamped information systems (internal factor)
    - Rapid growth
    - New technology
    - New lines of business, products or activities
    - Corporate restructurings
    - Foreign operations
    - Accounting pronouncements

Control Activities

Control activities are the actions established by policies and procedures that help ensure that management's directives are carried out Control activities encompass 3 principles.

a. Selection and development of control activities contribute to reducing risks to the achievement of the entity's objectives, as demonstrated through:
    - Integration with the entity's risk assessment and consideration of entity specific factors, including the various levels within the entity requiring control activities.
    - Identification of those processes and activities that require control activities.
    - Inclusion of a range of types of control activities, including manual and automated controls, preventive and detective controls, and appropriate segregation of duties.

b. General controls over technology are developed to support the achievement of the entity's objectives, as demonstrated through:
    - Management's understanding of the relationship between internal processes, automated controls, and general controls over technology.
    - The establishment of relevant control activities regarding technology infrastructure; security management; and acquisition, development, and maintenance.

c. Policies identify expectations and procedures convert policies into actions, as demonstrated through:
    - The incorporation of control activities into daily processes, designating responsibility and establishing accountability.
    - Tasks are performed in a timely manner, using competent personnel, with corrective action taken as appropriate.
    - The regular reassessment of control activities to verify their continued relevance.

Types of control activities include:

- **P**erformance reviews – actual vs. budget, P/Y, financial to non-financial
- **I**nformation processing – (IT) General vs. Application controls
- Application controls include Input, Processing and Output controls
- **P**hysical controls – Access to assets
- **S**egregation of duties includes assigning different people the responsibilities of **authorizing** transactions, **recording** transactions, maintaining **custody** of assets, and performing **comparisons**. It is intended to reduce the opportunities to allow any person to be in a position to both *perpetrate and conceal errors or irregularities* in the normal course of their duties (**ARCCS**).
    - **A**uthorization of transactions
    - **R**ecording (posting) of transactions
    - **C**ustody of assets
    - **C**omparisons

Information and Communication

Information and communication refers to the processes by which management obtains or generates and uses information and how it is disseminated throughout the entity and to appropriate business relationships. Information and communication encompass 3 principles.

a. The functioning of all components of internal control is supported by relevant, quality information obtained or generated by the entity, as demonstrated through:

- Identification of information requirements and the internal and external sources from which it is derived.
- The transformation of data into information through processing throughout which quality is maintained.
- Consideration of the cost of obtaining and disseminating information, weighed against the benefits.

b. The functioning of all components of internal control is supported by the internal communication of objectives and responsibilities, as demonstrated through:
   - Establishment of processes to communicate objectives and responsibilities to all appropriate personnel.
   - Communication between management and governance.
   - The provision of mechanisms, such as whistle-blower hotlines, that establish alternate channels of communication, allowing anonymous or confidential communication as needed.
   - Consideration of factors such as the nature and timing of information and its intended audience in establishing methods of communication.

c. External parties are informed as to matters affecting the effectiveness of appropriate components of internal control, as demonstrated through:
   - The establishment of channels and processes for communicating with external parties to provide relevant and timely information and obtain relevant and timely information from others.
   - The communication with governance of relevant information obtained from external parties.
   - The establishment of alternative communication channels and the selection of relevant methods of communication.

Managers must have access to timely, reliable, and relevant information in order to make effective decisions. Information systems should be implemented to capture information and process, summarize and report the information on an accurate and timely basis. Proper communication involves providing employees with an understanding of their roles and responsibilities. Open communication channels are essential to the proper functioning of internal control.

- **Info system** consists of the methods and records used to identify, record, measure, process, summarize, present, disclose and report co.'s transactions and to maintain accountability for the related accounts.
- **Communication** involves establishing individual duties and responsibilities relating to internal control and making them known to involved personnel.

Monitoring Activities

Monitoring refers to the processes the entity uses to determine if all components of internal control, including the principles within each component, are in place and are functioning in the manner intended. Monitoring activities encompass 2 principles.

a. Evaluations are conducted on an ongoing basis, on a separate periodic basis, or both to determine if controls are in place and are functioning effectively.
b. Internal control deficiencies are communicated to parties responsible for corrective action on a timely basis.

To assess the quality of internal control performance (are controls working?), controls are monitored by performing *ongoing evaluations* of activities (e.g., reviewing customer complaints when they come in) or by *separate evaluations* (e.g., periodic audits). Information systems can have

embedded modules that look for unusual or suspicious transactions or relationships. Two main categories of monitoring activities include "ongoing evaluations" and "separate evaluations."

In 2009, COSO issued *Guidance on Monitoring Internal Control Systems* that elaborates on the monitoring component of internal control. Individuals who monitor controls within an organization are referred to as evaluators. **Evaluators** should be both *competent and objective.*

Internal control systems *fail* because the controls are not designed or implemented properly; the environment changes or their operation has changed. Within a corporation, internal control should be evaluated by the internal audit staff who report to the board of directors.

Monitoring may be considered as consisting of the following **sequence of activities**:

- Control baseline – development of an understanding of how the system of internal control was designed and implemented.
- Change identification – use of ongoing and separate evaluations to identify and address changes in the effectiveness of I/C to initiate changes to controls.
- Change management – determination of when changes to I/C are needed and the types of changes that are likely to be effective.
- Control revalidation/update – development of a new baseline understanding of the revised system.

Limitations of Internal Control (inherent – COCO)

Internal control may not be effective because:

- Collusion
- Override by management
- Competence – errors or mistakes, poor human judgment
- Cost/benefit constraints
- Obsolescence – change in Co's operations or size

The mnemonic **CRIME** reminds management that it would be a crime not to consider all of the internal control elements when designing the system.

Lecture 2.05 – Fraud Risk Management Program

Fraud is any illegal act characterized by deceit, concealment or violation of trust. It is generally considered to be intentional, and deals with the integrity of the perpetrator, as opposed to errors, which are considered unintentional and deal with the competency of the perpetrator.

Typically, it can be divided into asset misappropriation (theft) or misstatement of financial statements. Members of upper management generally are more likely than non-management employees to misstate financial statements. Non-management employees generally are more likely than upper management to steal assets and then take steps to conceal the theft.

By its very nature, fraud involves some sort of deceit. An entity is vulnerable to severe long-term impact from fraud without active measures to deter, detect and minimize it. Basically, an ounce of fraud prevention is worth a pound of cure.

When an entity uncovers something that looks like fraud, it typically engages a certified fraud examiner (CFE) to investigate and assist in documenting it for prosecution and recovery, if any. Well-managed entities over a minimal size (often consulting with a CFE or CPA) develop a fraud risk management program (FRMP) long before a probable fraud event occurs.

Purpose

Reasons for a fraud risk management program span the spectrum from legal duty to entity survival.

- A FRMP helps the board of directors satisfy
    - Duty of care to stakeholders.
    - Statutory/regulatory requirements (Sarbanes-Oxley, SEC, PCAOB standards, etc.)
- A FRMP helps support stakeholder confidence (impact of fraud on profitability and available funding). Shareholders are unwilling to invest to support a fraudster; they invest to receive financial returns.
- A FRMP helps entity survival
    - Greater profitability
    - Intact or enhanced image
    - Improved efficiency & increased ability to meet commitments and obtain financing
- A FRMP helps to prevent, detect, and deter fraud.
- A FRMP helps enhance employee morale (makes it easier to attract and retain well-qualified talent)
    - Reduced stress
    - Greater job satisfaction and security
- Most fraud is **not** found by external auditors
    - Internal measures often find fraud while it still is relatively small, increasing the likelihood of recovery or, at least, reducing the size of the loss.
    - Internal measures often are cheaper to implement than paying an external audit firm for essentially the same results.
- The Association of Certified Fraud Examiners (ACFE) report an annual audit and a code of conduct present in about 80 percent of fraud cases. Clearly, these are insufficient alone.

Small entities are particularly vulnerable to fraud, as they tend not to have anti-fraud controls.

Fraud Discovery

According to the Association of Certified Fraud Examiners Report to the Nations on Occupational Fraud & Abuse (Using one's occupation for personal gain):

- Tips and whistle-blowers uncover about 40 percent of fraud. Management review and internal auditors each uncover about 15 percent of fraud. Accidents uncover over 5 percent of fraud. External auditors uncover **less** than 5 percent of fraud.
- Fraud losses are estimated at 5 percent of revenues.
- Typical losses are $140,000 per case and typical cases have an 18-month duration
    - Fraud has the highest impact on small entities.
    - The importance of the position of the perpetrator generally bears a direct relationship to the size of the loss.
- "Red flags" are present in over 80 percent of cases:
    - Living beyond means or personal financial difficulties
    - Unusually close relationships with vendors or customers
    - Excessive control issues

Occupational fraud is the use of one's occupation for personal gain through the deliberate misuse or misapplication of the organization's resources or assets. Types of Occupational Fraud and Abuse include misappropriations of assets, corruption and financial statement Fraud.

Five Steps in a Fraud Risk Management Program (FRMP)

1. Establish governance policies
2. Conduct a comprehensive risk assessment
3. Plan and execute preventive and detective control processes
4. Perform timely and confidential investigations
5. Monitor and assess the program (periodically, on an ongoing basis, or both periodically and on an ongoing basis) reporting the results and improving the processes

An effective FRMP will deter, but not eliminate, fraud. An effective FRMP:

- Initiates a visible and rigorous fraud governance process
- Promotes a transparent and sound anti-fraud culture
- Entails a thorough periodic fraud risk assessment
- Plans, executes, and maintains preventive and detective fraud control processes
- Responds quickly to fraud allegations, including loss recovery actions and proceedings against perpetrators

Five Fraud Risk Management Principles (CRIME) under COSO

1. Control ***E***nvironment: The organization establishes and communicates a Fraud Risk Management Program that demonstrates the expectations of the board of directors and senior management (Tone at the Top) and their commitment to high integrity and ethical values regarding management fraud risk (CHOPPER).
2. ***R***isk Assessment: The organization performs comprehensive fraud risk assessments to identify specific fraud schemes and risks, assess their likelihood and significance, evaluate existing fraud control activities, and implement actions to mitigate residual fraud risks.
3. ***C***ontrol Activities: The organization selects, develops, and deploys preventive and detective fraud control activities to mitigate the risk of fraud events occurring or not being detected in a timely manner.

4. ***I***nformation & Communication: The organization establishes a communication process to obtain information about potential fraud and deploys a coordinated approach to investigation and corrective action to address fraud appropriately and in a timely manner.
5. ***M***onitoring Activities: The organization selects, develops, and performs ongoing evaluations to ascertain whether each of the five principles of fraud risk management is present and functioning and communications FRMP deficiencies in a timely manner to parties responsible for taking corrective action, including senior management and the board of directors.

Roles of Key Parties in Managing Fraud Risk (outlined by ACFE)

- **Those Charged with Governance (ideally, the Audit Committee)**
  - Consider the risk of management override of controls.
  - Monitor fraud risks throughout the entity (using internal auditor or other personnel).
  - Meet privately with appropriate individuals (e.g., internal auditor, external auditors).
  - Consider reputation risk when reviewing work of management, internal auditors, and external auditors.
  - Remain cognizant of the external auditor's responsibilities pertaining to fraud.
  - Seek counsel when responding to allegations of fraud.
- **Board of Directors (BOD)**
  - Understand fraud risks (both generally and those affecting the entity).
  - Establish and communicate an appropriate level of risk tolerance for the entity.
  - Maintain oversight of the fraud risk assessment.
  - Monitor management's reports on fraud risks, policies, and control activities.
  - Ensure that management provides effective fraud risk management documentation to encourage ethical behavior.
  - Retain outside experts as appropriate.
  - Remain cognizant of the external auditor's responsibilities pertaining to fraud.
- **Management (CEO, CFO, COO, etc.)**
  - Design, implement, maintain and document the fraud risk management program.
  - Maintain documentation of antifraud controls.
  - Evaluate design and operating effectiveness of antifraud controls.
  - Report to the BOD on actions that have been taken to manage fraud risks and the effectiveness of the fraud risk management program.
  - Educate the entity on areas of potential compliance violations.
  - Enforce the entity's Code of Ethics.
- **Internal Auditors**
  - Report to those Charged with Governance
  - Provide assurance to the BOD and management regarding existing controls' appropriateness given the risk tolerance established by the BOD.
  - Evaluate the design and operation of antifraud controls for comprehensiveness and adequacy, especially regarding management override risks.
  - Support the audit committee in performing detective activities around the risk of management override of controls
  - Consider fraud risks when developing audit plans.
  - Support management's education of the entity regarding areas of potential fraud and compliance violations.

- **Employees (in all functions and at all levels)**
  - Have a basic awareness of fraud and "red flags."
  - Comprehend policies and procedures (e.g., fraud policy, code of conduct, whistleblower policy, internal controls specific to position, etc.).
  - Contribute to a strong control environment.
  - Report suspicions or incidences of fraud and corruption.
  - Cooperate with audits and investigations.

Typical Shortcomings

A fraud risk assessment (part of an entity's broader risk assessment process) considers the ways that fraud and misconduct can occur by and against the entity. The ACFE finds that fraud risk assessment failures typically are due to one or more of the following:

- Assessment consists of an identification of risk factors, but omits an identification of schemes and scenarios.
- Lack of follow up after identification of fraud risks and linkage to mitigating controls.
- Potential perpetrators are not identified (which can lead to insufficient consideration of management override).
- Inadequate consideration of collusive fraud and management override of controls.
- Lack of appropriate involvement in assessment by internal auditors and other appropriate personnel.
- Lack of appropriate monitoring by the audit committee.

While a FRMP cannot guarantee the absence of fraud, it can deter fraud and minimize fraud loss much less expensively than other measures. Entities cannot rely complacently on an annual audit and a code of ethics to prevent fraud.

Lecture 2.08 – Enterprise Risk Management (ERM)

The business and economic environment is often unpredictable with significant technology evolution, rapidly shifting customer behavior, global influences, and fierce competition—all factors that stress strategic planning and the need to maximize operational capabilities to survive and thrive. All this creates uncertainty, which provides both risk and opportunity, and management must determine how to balance those risks and opportunities in alignment with the objectives of the entity. As you can imagine, this can be an extremely daunting task without an organized ERM approach to help keep up with the pace of change facing entities today.

To respond to the need for this organized approach, COSO developed an ERM **framework** in 2004 and updated it in 2017 to complement the internal control framework previously discussed. COSO's ERM framework is designed to be applied by all types and sizes of entities ***to strategically identify events that may affect the entity and to manage those risks in accordance with the entity's risk appetite, to provide reasonable assurance of achieving the entity's objectives***. As updated in 2017, due to the increasing complexity of business risks, the accelerated rate of emerging new risks, and the demand for better risk reporting, the framework, retitled *Enterprise Risk Management—Integrating with Strategy & Performance,* dives deeper to redefine risk in relation to strategy and performance and focuses on the need to embed ERM proactively throughout the entity.

Benefits

COSO touts several benefits to implementing its ERM framework:

- Promotes identification and *management of entity-wide risks*.
- *Increases identification of opportunities* by examining the pros and cons of possibilities.
- *Reduces costs* of negative surprises and *maximizes positive outcomes*.
- Manages performance risks to *reduce disruption and increase opportunity*.
- Prioritizes and *maximizes allocation of resources*.
- Enhances entity *resilience*—the ability to anticipate and respond to change.

Components & Principles Overview

COSO's new ERM framework has *5 components* **(COPe RR)** and *20* different associated *principles* as outlined below.

Governance & *C*ulture

1. Exercises board risk oversight
2. Establishes operating structures
3. Defines desired culture
4. Demonstrates commitment to core values
5. Attracts, develops, and retains capable individuals

Strategy & *O*bjective Setting

6. Analyzes business context
7. Defines risk appetite
8. Evaluates alternative strategies
9. Formulates business objectives

***Pe*rformance**

10. Identifies risks
11. Assesses severity of risks
12. Prioritizes risks
13. Implements risk responses
14. Develops portfolio view

***R*eview & Revision**

15. Assesses substantial change
16. Reviews risk and performance
17. Pursues improvement in ERM

Information, Communication & *R*eporting

18. Leverages information systems
19. Communicates risk information
20. Reports on risk, culture, and performance

Governance & *C*ulture

The first of the five components of the COSO ERM Framework is *Governance and Culture*. It sets the overall tone for the organization, addressing such issues as mission, vision, and core values. Governance encompasses the establishment of oversight responsibilities for ERM and the entity's tone. Culture refers to the ethical mindset, standards of acceptable behavior, and understanding the entity's risk.

Principle 1: Exercises Board Risk Oversight

"The board of directors provides oversight of the strategy and carries out governance responsibilities to support management in achieving strategy and business objectives."

The board's oversight role supports the creation of value in an entity and prevents its decline. The framework catalogs risk oversight responsibilities for boards. These responsibilities include overseeing governance and culture; strategy and objective-setting; performance; information, communications and reporting; and the reevaluation and improvement of practices to enrich entity performance. The board's risk oversight role includes, but is not limited to:

- Cultivating investor and stakeholder relations
- Authorizing management pay and incentives
- Reevaluating, questioning, and agreeing with management on:
    - Suggested strategy and target risk appetite
    - Coordination of strategy and business objectives with the entity's mission, vision, and values
    - Major decisions including mergers, acquisitions, capital allocations, funding, and dividend-related decisions
    - Reactions to substantial fluctuations in entity performance or the risk portfolio
    - Treatment of instances of deviation from values

Management is responsible for managing risks to the entity. To evaluate management's performance, a board generally would determine the answers to the following questions, among others. The answers may illustrate the entity's actual mindset for risk taking as opposed to what appears in documentation.

- Can all levels of management—not just senior management—articulate how risk is considered in the selection of strategy or business decisions?
- Can all levels of management clearly articulate the entity's target risk appetite and how it might influence a specific decision?
- How does the culture promote or retard responsible risk taking?
- How does management monitor the risk culture and how it changes? What changes have occurred?
- As changes occur, how does management ensure a suitable and prompt response?

Principle 2: Establishes operating structures

"The organization establishes operating structures in the pursuit of strategy and business objectives."

Principle 3: Defines desired culture

"The organization defines the desired behaviors that characterize the entity's desired culture."

Principle 4: Demonstrates commitment to core values

"The organization demonstrates a commitment to the entity's' core values."

Principle 5: Attracts, develops, and retains capable individuals

"The organization is committed to building human capital in alignment with the strategy and business objectives."

Principles 2 through 5 represent the *internal environment*, which sets the tone for the organization. It establishes a basis for the analysis of risk, incorporating management's philosophy, the entity's risk appetite, and the values that are important to the entity, such as *integrity and ethical values.*

The internal environment is exhibited in a variety of ways, both formal and informal. Some of the more formal components will include the entity's mission statement and its code of conduct. These should be evident in all aspects of the entity and should be incorporated into the entity's culture. A well-designed **mission statement** may address some or all of the following:

- The moral or ethical position of the entity and its desired public image
- The key strategic influence for the entity's operations
- A description of the entity's products or services, target market, and geographical domain
- Expectations in relation to growth and profitability

The informal aspect of the internal environment is probably the most important. It is comprised of the actual behavior of members of management and others who might be seen as influential within the organization. Whenever the behavior of such individuals is in conflict with the entity's mission statement or core values, or its formal policies and procedures, individuals both inside the organization and outside of it will assign more significance to the behavior.

One significant aspect of management and executive behavior is the relationship established with employees. Management should exhibit a willingness to tolerate mistakes, listen, and learn.

Strategy & *O*bjective Setting

The second component of the COSO ERM Framework is *Strategy & Objective Setting*. It represents the entity's process for strategic planning. The entity determines its risk appetite, aligns it with its

strategy, and develops business objectives to execute the strategy. This process serves as a basis for recognizing, evaluating, and responding to risk.

Principle 6: Analyzes Business Context

"The organization considers potential effects of business context on risk profile."

Business context refers to the environment in which the business operates. ERM involves considering a full range of potential events, enabling management to identify and take advantage of opportunities. Also see principle 10.

Principle 7: Defines Risk Appetite

"The organization defines risk appetite in the context of creating, preserving, and realizing value."

It is important for management to consider what level of risk is acceptable when evaluating alternatives, establishing goals, and developing policies, procedures, and other mechanisms to manage risks. For example, an entity should consider its risk appetite when determining its policy regarding the amount of information that must be obtained about a potential customer and how much must be verified independently before extending credit in order to avoid selling to someone who is not likely to pay.

Principle 8: Evaluates Alternative Strategies

"The organization evaluates alternative strategies and potential impact on risk profile."

Strategy is about developing a plan of action to achieve the entity's objectives. In evaluating alternative strategies, the entity must first align potential business strategies with the entity's mission, vision, and core values, and then determine the impact of those strategies with respect to the entity's risk profile (i.e. risk appetite). COSO's ERM framework provides 3 types of risks to consider in this process:

- **Risks *to* a chosen strategy** and the performance of that strategy—These are factors an entity should address when choosing a strategy, such as customer demand, supply, competition, and technology infrastructure.
- **Risks that the strategy chosen will *not align* with the mission, vision, and values**—Even if a strategy is successful, a misaligned strategy increases the risk that the entity will not achieve its mission and vision, or its values will be compromised. While some entities have been reluctant to truly embrace their mission, vision, and values, they have been shown to be extremely important to risk management and resilience in times of change.
- **Risks *of, or from*, the chosen strategy**—Every choice has some downsides. The risks of the strategy that is chosen should be considered and aligned with the risk appetite of the entity. The board and management should determine how the strategy will steer the entity in setting objectives and whether resources will be allocated efficiently.

Note: It's important to realize that ERM is as much about *understanding* all the risks as it is about managing them to enhance the performance of the entity.

Principle 9: Formulates Business Objectives

"The organization considers risk while establishing the business objectives at various levels that align and support strategy."

While an entity's mission describes what it would like to accomplish, it does not set out a specific plan for accomplishing the mission. Management translates the mission into goals or objectives that support the mission and take into account the entity's risk appetite. The *department manager*

would be the best person to devise and execute the risk procedures for a particular department, as they are the most able to identify risky events within that department.

There are four types of business objectives to establish:

- Setting objectives begins at the top with **strategic objectives**, which establish a unifying theme for the entity and direct actions and decisions. While strategic objectives set the direction for the entity, objectives related to *operations, reporting, and compliance* provide the mechanisms for meeting those objectives. To be most effective, objectives should be set at each level and, when appropriate, in each of the three categories. A division manager, for example, should know what outputs their division is expected to provide, to whom, to what specifications, and on what timetable so that the manager can make the decisions that will accomplish those objectives.

- The strategic objectives may relate to the quality and other characteristics of the outputs and how the division will be operated. In order to achieve the strategic objective as to quality, the division manager will need the appropriate raw materials, qualified laborers, and the equipment or other resources necessary to convert those inputs into the desired outputs. **Operational objectives**, as a result, may be set to address the acquisition of raw materials, the screening and assignment of laborers, the acquisition and maintenance of equipment and support, and the process for completing the outputs.

- **Reporting objectives** would be established to determine how the division is progressing toward meeting the operational objectives and, ultimately, the strategic objectives. The manager will need to devise a means of determining if the needs of the customer are being met. This may involve obtaining feedback from a subsequent department as to the quality and amount of output that is being transferred. It may involve obtaining feedback from the work force as to the quality of the raw materials that are being provided or from supervision regarding the efficiency of the labor. Achievement of reporting objectives may require sophisticated reports that provide a large amount of information manipulated in a variety of ways. The most effective information is often limited in scope to one or very few parameters, does not require a great deal of effort to accumulate and report on a timely basis, and can be simply understood.

- **Compliance objectives** make certain that the division operates within appropriate guidelines, including both regulatory requirements and internal company policies. This includes making certain that employees are not working against the better interests of the employing entity. At the same time, they must be designed so that an employee does not violate requirements externally imposed in a misguided attempt to help the entity.

*Pe*rformance

The third component of COSO's ERM Framework is *Performance*. It represents the process of actually identifying, evaluating, and responding to risks. The risks should be prioritized by severity with regard to the entity's risk appetite. The entity then chooses the appropriate responses, while keeping an overall view of the amount of risk assumed. Results are reported to the appropriate stakeholders.

Principle 10: Identifies Risks

"The organization identifies risk that impacts the performance of strategy and business objectives."

The occurrence or nonoccurrence of certain events (i.e., risks) will determine whether or not the entity will achieve its objectives. Thus, risk identification involves determining what those events may be and how to distinguish between those events that representing opportunities, which should be encouraged and exploited, and those representing threats, which should be dealt with in accordance with the entity's risk appetite.

- **Opportunities must be exploited** in order to gain a competitive advantage, sustain one, or prevent a competitor from obtaining one. As such, opportunities should be considered in developing the strategic and other objectives of the entity. A plan might be established, and resources might be set aside, to take advantage of an opportunity in case it arises. Of course, the amount of effort going into the design of the plan and the resources set aside to take advantage of the opportunity will be a function of the likelihood that the event will occur, which is analogous to risk assessment, and the benefit that will be derived from it, which will be a factor in determining the appropriate response.
- Likewise, **risks must be prepared for** so that the entity does not lose a competitive advantage or allow a competitor to gain one. As a result, adverse events are considered in the entity's risk management process. The entity will consider the likelihood that an event will occur, the magnitude of the effect of the event, and the amount the effect will be influenced by actions of the entity in determining an appropriate response.

Event identification is primarily the identification and monitoring of the sources of information that pertain to areas of risk for the entity. Since resources are limited, the entity must be discreet in deciding which sources of information will be monitored. One approach, an aspect of risk assessment, is to determine the resources that are critical to achieving the objectives of the entity. The entity might then be able to identify the types of events that would affect that resource and might be able to seek out sources of information that would help the entity estimate the likelihood of the event and alert the entity of its occurrence, or imminent occurrence, on a timely basis. There are various techniques for identifying relevant events for ERM:

- **Event inventories** are detailed lists of the types of events the entity may be subject to due to the industry it is in, its geographic location, or other characteristics of its operations.
- **Internal analysis**, often done as part of routine business planning, may consist of discussions at meetings, or formal processes that are conducted on a routine basis. They utilize information that is developed internally as well as that obtained from external sources including customers, suppliers, and business relationships, as well as from the news, governmental reports, and other general sources.
- **Escalation or threshold triggers**, which involves the establishment of benchmarks or other criteria against which experiences can be compared to identify those that may require attention. These may be routine, such as reports on delinquent accounts receivable that will trigger collection procedures or monitoring devices that warn of factory temperatures exceeding certain limits.
- **Facilitated workshops or interviews** may be conducted for the specific purpose of learning of event indicators. They may involve staff, outside consultants, or experts in various fields. An auditor, for example, is required to conduct a brainstorming session with key staff to identify fraud risk factors. This enables the auditor to use the combined knowledge and experience of all participants to identify signs of fraud. Similarly, a meeting with factory staff may be useful in identifying signs of an unsafe condition, thereby preventing an undesirable event in the form of an accident.
- **Process flow analysis** involves the consideration of all components of a process including its inputs, tasks, responsibilities, and outputs. The factors affecting each aspect of the process can be considered to identify events that may be relevant, such as a potential scarcity of a resource used as a raw material in the process.

- **Leading event indicators** involves identifying data that is indicative of a pending event, such as an increase in consumer spending, which may correlate with possible increases in future interest rates.
- **Loss event data methodologies** are collections of information regarding past losses that may have been incurred by the entity or others to identify causes or trends. In anticipating allocating a new contract among different manufacturing plants, analyzing returned goods may identify that certain plants are delivering defective parts and the company can avoid a loss by not awarding the contract inappropriately. *Black swan analysis* involves evaluating the occurrence of events that had a negative effect and were unanticipated or viewed as highly unlikely.

ERM also identifies categories of events, including:

- ***Internal*** factors such as infrastructure, personnel, processes, and technology
- ***External*** factors such as economy, natural environment, politics, social factors, and technology

Three broad approaches might be employed to identify events that may have an adverse effect on an entity. These approaches are not mutually exclusive and an entity should apply all in its risk assessment at all levels of the organization. These three approaches can be described as a balance sheet approach, a process approach, and an event identification approach.

- Under the **balance sheet approach**, the entity should identify the resources within its control and determine which ones might be vulnerable and the degree of vulnerability. Most any assets might be misappropriated, for example, but the likelihood of misappropriation and the damage the entity would sustain upon misappropriation will be important factors in evaluating risk.

    - *Assets essential to the achievement of the entity's objectives*, such as raw materials; exclusive information, formulae, or processes; and customer lists, for example, might be so essential to the entity that they will require protection regardless of their cost or the likelihood of their misappropriation. Other assets might not be essential to the entity but might be used by employees or general consumers in their everyday lives. These might include cash, supplies, and other assets like certain inventories. The risk evaluation must take into account that these assets are particularly susceptible to misappropriation or other misuse.

    - When applying the balance sheet approach, it is important to consider *assets owned by the entity, its intellectual property, and its human resources*. It is also important to consider all of the individuals who are in position to create events that will affect the entity. This might include employees with access to, or custody of, assets. As discussed earlier, threats may come from internal sources, including employees, officers, and directors. They may also come from external sources, including competitors and potential competitors, customers, and con artists.

- The **process approach** involves evaluating the processes that are used to achieve the entity's objectives. At the entity level, this might include the process for establishing objectives and allocating resources. All processes, at all levels, should be considered. This will include the process for determining when a raw material or supply should be purchased, the process for providing a service or manufacturing a component of inventory, the process for obtaining supplies, and the process for recording a transaction. The evaluation of risk under this approach includes the consideration of various possibilities.

For each possibility, the entity must consider the likelihood that the possibility will become a reality and its consequences. Examples might include the risk that a process will not be performed, that it will not be performed on a timely basis, or that it will not be performed correctly. Consequences may range from being negligible to very significant. Neglecting to perform a process properly may result in defective inventory, a work stoppage, or product liability.

- The **event identification approach** incorporates many of the principles already discussed. One of the most difficult aspects of this approach is limiting the number of areas in which sources for information are sought. This might be accomplished when viewing the entity from the standpoint of competition. In *Contemporary Strategy Analysis*, Robert Grant discusses Michael Porter's Five Forces of Competition. These include customers, suppliers, competitors, potential entrants into the market, and substitutes. The entity should seek to identify events that might affect any of these five forces.

    - In the case of *customers*, increases or decreases in the *demand* for their products or services may affect the demand for the entity's products or services. *Economic events* may make it easier or more difficult for customers to pay for the entity's products or services on a timely basis. *Changes in customers' needs* may make certain features of the entity's products or services more or less valuable to customers. Other types of events may create *new customers*, such as a change in an industry's manufacturing process that makes the entity's products or services valuable to entities that had no previous use for them.

    - When an entity is evaluating *events that may affect suppliers*, it must consider all of its suppliers, including *suppliers of human resources, financial resources, and physical resources.* Events including changes in school enrollments or *graduation rates, failing or emerging industries*, and *shifts in population* may affect the supply of human resources. *Economic and social events*, as well as events affecting other entities seeking the same human resources, may affect the compensation and benefits required to attract or retain the appropriate human resources.

    - *Economic events may affect the availability and the cost of capital.* The entity's access to financial resources will also be affected by the availability of investment alternatives. The availability of physical resources may be affected by events related to weather or other natural phenomena. In addition, increases or decreases in the *demand* for the goods and services of an entity's suppliers will affect the cost and availability of those goods and services to the entity.

    - *Events that affect competitors* also affect the entity. Innovations that result in changes to their processes may provide them with a competitive advantage or eliminate one held by the entity. When operating in a finite market, events that create an advantage to competitors generally result in a disadvantage to the entity. As competitors devote more resources to marketing, they may improve their access to customers and reduce the entity's market share. More resources devoted to recruiting may increase access to human resources, decreasing those available to the entity. When events affect competitors' sales volumes, it affects their demand for raw materials, which will affect the price and availability of those raw materials to the entity.

- *Events that change the cost of entry into the market* will encourage or discourage potential competitors. Events might include those related to the *cost of capital, access to customers or suppliers, or the ability to emulate or improve processes*. Obviously, events that lower the cost of entry into the market will increase competition, while events that increase it may decrease competition and, at a minimum, will slow down increases in it.

- *Substitutes* affect the entity in two ways. They are in competition for the attention of suppliers as well as for the attention of customers. Substitutes include those who might use the same resources that are used by the entity. *Events that increase or decrease their need for common resources* will affect the price and availability of those resources to the entity. In addition, the extent to which events will cause customers to see other products or services as substitutes for those of the entity will increase or decrease *demand* for the entity's products or services.

Principle 11: Assesses Severity of Risks

"The organization assesses the severity of risks."

Management must evaluate the extent of potential effects of identified events on the ability of the entity to achieve its objectives. The likelihood of the occurrence of each identified risk is measured as well as the potential effect on the entity if the event were to occur. Here's three approaches used to quantify risk:

- **Benchmarking**, which compares expected outcomes to common measures.
- **Probabilistic models**, which develop expected values using probabilities of possible outcomes (quantifying risk).
- **Nonprobabilistic models**, which use subjective assumptions to measure possible outcomes (qualitative, but not quantitative).

Principles 12. Prioritizes Risks

"The organization prioritizes risks as a basis for selecting responses to risks."

Once management has identified and assessed the severity of the risks that may affect the entity's ability to achieve its objectives, it can decide how to prioritize the risks so that management can effectively assess capital needs and allocate capital where it is most needed or will be most productive.

Principle 13. Risk Response

"The organization identifies and selects risk responses."

When deciding on an appropriate risk response, the entity must consider inherent risk and residual risk.

- **Inherent risk** is the risk to the entity *if no action is taken*.
- **Residual risk** is the risk to the entity that would remain *if action were taken* and controls are taken into account.

The *reduction in risk*—basically the difference between an event's inherent risk and its residual risk—*can be compared to the cost of taking action to determine if action is appropriate*. This type of analysis is also useful in deciding among alternative actions when more than one risk response is available.

Among the **alternative responses to risks** are the decisions to *avoid* a risk, *mitigate* the risk, *share* the risk, or simply *accept* the risk. For example, if there is not sufficient verifiable information about a potential customer, the company can avoid risk by not extending credit, reduce it by limiting the amount of credit extended, share it by entering into an agreement with a third party, such as a bonding company or a guarantor, or accept it by extending credit.

- **Acceptance** of a risk indicates that the entity would take no action and simply allow the event to occur. This would be appropriate when the entity believes that inherent risk is already at an acceptable level or that the cost of taking action would exceed the reduction in risk that would result from the action anticipated.

- If the inherent risk is above an acceptable level, an entity might next seek to share that risk. **Sharing** the risk might involve the use of insurance or fidelity bonds, entering into an arrangement with another entity to share the risk, or outsourcing an activity. Outsourcing may be considered an example of sharing risk or avoiding it. In addition, the risks being "avoided" by the outsourcing entity are taken into account and incorporated in the cost of the product or service being outsourced.

- An entity that cannot find a cost-efficient manner of sharing the risk may decide to reduce it. **Reducing** the risk may require a change in the internal environment or may be accomplished through control activities, which can often reduce risk to an acceptable level. An entity may reduce the risk of inventory misappropriation, for example, by keeping it in a more secure location. It may also minimize losses through early detection. This could be accomplished if the entity maintains a perpetual inventory system and conducts regular and frequent counts. Such a system may be costly, and the costs should be compared to the anticipated reduction in risk to determine whether such control activities would be cost effective.

- When risk cannot be reduced to an acceptable level, **avoidance** may be the best alternative. This may require an entity to change an internal process, eliminate a line of business or product, stop using a particular raw material or buying from a specific supplier, or discontinue selling to a particular customer. An entity may determine that it does not have the ability to monitor receivables efficiently and the cost of reducing losses to an acceptable level would be prohibitive. As a result, the entity may decide to make all sales for cash, checks, and debit or credit cards and discontinue accepting sales on open account.

Principle 14. Risk Portfolio

"The organization develops and evaluates a portfolio view of risk."

ERM is designed to help management evaluate the interrelated impacts of decisions and deal with multiple risks. One risk may combine with other risks or offset other risks. Management must be careful when developing policies and procedures that are designed to affect one issue as, due to the integrated nature of business, it increases a different risk. For example, if we decide not to sell to the customer on credit, we also risk losing the customer to a competitor and adversely affecting the enthusiasm of the sales person who worked to bring the customer in.

*R*eview & Revision

The fourth component of the COSO ERM Framework is Review & Revision. It represents the process of evaluating how well ERM components perform over time and refining the components as conditions change, as necessary.

Principle 15: Assesses substantial change

"The organization identifies and assesses changes that may substantially affect strategy and business objectives."

Principle 16: Reviews risk and performance

"The organization reviews entity performance and considers risk."

Principle 17: Pursues improvement in ERM

"The organization pursues improvement of enterprise risk management."

Risk assessment is an ongoing process, not a "one-time" activity. The entire ERM system must be monitored so that changes can be made on a timely basis. Monitoring may be through ongoing management activities or as part of a separate evaluation of the entity's ERM process.

Information, Communication & *R*eporting

The last of the five COSO ERM Framework components is *Information, Communication & Reporting.* It represents the ongoing exchange of internal and external information up and down as well as across the entity.

Principle 18: Leverages information and technology

"The organization leverages the entity's information and technology systems to support enterprise risk management."

Principle 19: Communicates risk information

"The organization uses communication channels to support enterprise risk management."

Principle 20: Reports on risk, culture, and performance

"The organization reports on risk, culture, and performance at multiple levels and across the entity."

People must have relevant information to carry out their responsibilities. As a result, the entity must have a means of identifying what information is pertinent from all of its internal and external sources.

Relevant information may be financial or nonfinancial and may be quantitative or qualitative in nature. It may also be formal or informal, such as that derived from conversations with customers or suppliers. It can potentially come from such a wide range of sources that it becomes very important for an entity to determine what sources are reliable as well as what information is relevant.

Once identified, relevant information must be captured, processed, and communicated to those who can benefit from it. It must be put into a form that is usable and must be provided on a timely basis so that decisions can be made to prevent losses.

Communication must include parties to whom it is relevant. It is most effective when lines of communication move in all directions within and around an organization. There should be communication at all levels, including upward and downward communication. Likewise, relevant information should be communicated with customers or suppliers to enhance the entity's ability to meet the needs of customers and have its needs met by suppliers.

Inherent Limitations of ERM

Applying ERM may enhance an entity's opportunity to be successful, but it does not ensure it. Regardless of how well a system is designed, implemented, and operated, there are certain *inherent limitations on ERM:*

- The future, by its nature, cannot be predicted with certainty.
- Some events are beyond management's control and, due to the need to allocate scarce resources, the entity will not necessarily be able to pursue all objectives to the extent desired.
- No system process, regardless of how well designed and managed, will necessarily always accomplish what it is intended to accomplish (i.e., there is no absolute assurance).

As is true of most systems, ERM can provide reasonable, but not absolute assurance that objectives will be met. Some of the reasons that this is the case include:

- Decisions made in designing, implementing, and operating a system are often largely depending on human **judgment**, which is not perfect.
- Systems can suffer **breakdowns** due to changes in personnel, technology, or the failure of any component of the system.
- Systems can be overcome by dishonest individuals through **collusion**, which negates effective segregation of duties.
- Decisions in design, implementation, and monitoring always require an analysis of **costs versus benefits** because entities do not have unlimited resources.
- Effective controls are often subject to **management override**.

Lecture 2.10 – Dodd-Frank Act

Following the housing and financial crises that resulted in the recession of 2007-2009, there were many calls for financial reform. These calls resulted in the wide-ranging Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, referred to as "Dodd-Frank."

Dodd-Frank was passed to promote the *financial stability* of the U.S., *improve the accountability and transparency* of the financial system, end *"too big to fail," end bailouts* (GM, Chrysler, Citigroup, and Bank of America), and to protect consumers from *abusive financial services practices*. It affects many aspects of the financial system and many financial regulatory agencies (i.e., regulators), sets up new regulatory agencies, and calls for regulators to adopt over 240 new rules and regulations. There are 16 titles within the Act.

Title I – Financial Stability

This title creates the Financial Stability Oversight Council (FSOC). The council is tasked with identifying risks to U.S. financial stability, promoting market discipline by eliminating the expectation of a government bailout, and responding to emerging threats to financial stability. It is responsible for monitoring the financial system, collecting information, and making recommendations to other agencies and is subject to audit by the U.S. Comptroller General.

The Council is authorized to require registration with and oversight by the Federal Reserve of nonbank financial entities if their financial distress or other factors could make them a threat to U.S. financial stability (systemically important financial institutions, SIFIs). The Council may also require bank holding companies with total assets of at least *$50 billion* and nonbank financial entities required to register to *submit certified reports* indicating their financial condition, systems for managing risks, transactions with subsidiary depository institutions, the extent to which adverse conditions may affect U.S. financial stability (stress tests), and companies' plans for orderly shutdown should they become insolvent (living wills).

This title also creates the Office of Financial Research (OFR) to support the Council in fulfilling its purpose. It consists of a data center, responsible for data collection, and a research and analysis center. The OFR can also issue a subpoena when necessary.

Title II – Orderly Liquidation Authority

This title gives the Secretary of the Treasury the authority to liquidate financial companies that pose a significant threat to U.S. financial stability. It will identify financial companies as candidates for receivership, appointing the Federal Deposit Insurance Corporation (FDIC) as receiver. The companies may voluntarily go into receivership or will be evaluated by the FDIC and a determination will be made. Federal authority over liquidations of depository institutions (by the FDIC and NCUA) and brokerage firms (by the SIPC) already existed before Dodd-Frank. Dodd-Frank adds authority over SIFIs, which may include any financial institution individually identified by FSOC (including potentially any of insurance companies, investment banks, private equity firms, etc.).

- The Securities Investor Protection Corporation (SIPC) continues to oversee liquidations of covered brokers or dealers.
- For most depository institutions (commercial banks and thrifts) and, newly, SIFIs, the Federal Deposit Insurance Corporation (FDIC) will oversee liquidations. For credit unions, the National Credit Union Administration (NCUA) continues to oversee liquidations.

This title also requires that various studies be performed related to:

- Protections for secured investors
- The liquidation process for financial institutions

Title III – Transfer of Powers to the Comptroller of the Currency (i.e., the OCC), the Corporation (i.e., the FDIC), and the Board of Governors (i.e., the Federal Reserve)

The objectives of this title are indicated as:

- Providing safe and sound operation of the U.S. banking system;
- Preserving and protecting the dual system of Federal and State chartered depository institutions;
- Ensuring fair and appropriate supervision of each depository institution; and
- Streamlining and rationalizing the supervision of depository institutions and their holding companies

It eliminates the Office of Thrift Supervision (OTS). (Thrifts are depository institutions, commonly referred to as (1) savings and loans or (2) savings banks, with federal or state charters that historically emphasized lending for housing or charitable purposes, but that, in recent decades became largely similar to commercial banks - except for some remaining emphasis on residential mortgage lending). Dodd-Frank transferred the three sets of functions of the OTS as follows. (1) Thrifts with federal charters will be regulated by the Office of the Comptroller of the Currency (OCC, which was already the regulator of federally-chartered commercial banks, i.e., national banks. (2) Thrifts with state charters will have the FDIC as their federal regulator (along with their state regulators). The FDIC was already the federal regulator of state-chartered commercial banks. (3) Savings and loan (i.e., thrift) holding companies will be regulated by the Federal Reserve (like bank holding companies).

This title also includes reforms to the Federal Deposit Insurance Act, including:

- Giving the FDIC the authority to suspend the declaration or payment of dividends
- Changing the reserve ratio requirements for depository institutions
- Making indefinite the increase in the amount insured (the cap or ceiling) from $100,000 to **$250,000.** (The cap had been increased, on a temporary basis, earlier during the financial crisis). Per 2006 law (still in force), the cap is to be updated every five years to keep up with inflation (but only in $10,000 increments).

Other matters in this title include:

- Requiring each agency to establish an Office of Minority and Women Inclusion, responsible for diversity in management, employment, and business activities.
- Dodd-Frank provided for unlimited deposit insurance for noninterest bearing transaction accounts (i.e., for businesses) during the years 2011-2012. Since that period has ended, noninterest bearing transaction accounts are insured only up to the $250,000 cap.

Title IV – Regulation of Advisers to Hedge Funds and Others (referred to as the Private Fund Investment Advisers Registration Act of 2010)

This title requires investment advisers to hedge funds and private equity funds with more than *$150 million in assets* to register with the Securities and Exchange Commission (SEC). Hedge funds with under $150 million in assets, venture capital funds, and family offices remain exempt from registration.

This title requires the SEC to study the appropriate criteria for an **accredited investor** and amends the current standard by requiring a minimum net worth at the time of investment of **$1 million *excluding the value of the person's primary residence***.

Title V – Insurance (referred to as the Federal Insurance Office Act of 2010)

This title establishes the Federal Insurance Office to monitor all aspects of the insurance industry, excluding health insurance, long-term care insurance, and crop insurance. Responsibilities include:

- Identifying issues or gaps in regulation that could contribute to a systemic crisis in the industry;
- Monitoring whether traditionally underserved market segments have access to affordable insurance products (minorities and low-income consumers); and
- Recommending that the Financial Stability Oversight Council designate an insurer as subject to registration as a nonbank financial entity.

Title VI – Improvements to Regulation of Bank and Savings Association Holding Companies and Depository Institutions (referred to as the Bank and Savings Association Holding Company and Depository Institution Regulatory Improvement Act of 2010)

This title requires financial holding companies to be well capitalized and well managed. It also enhances limitations on bank transactions with affiliates. It adds derivatives to the instruments to be considered when evaluating adherence to lending limits.

The title also includes what is referred to as the **Volcker Rule**, named for Paul Volcker, former Chairman of the Federal Reserve, intended to prevent depository institutions from making risky investments with depositor funds. It increases regulation of the transactions of banking entities. It prohibits proprietary trading and the acquisition or holding, unless immaterial, of an ownership interest in a hedge fund or private equity fund. It limits investments by a banking entity in hedge funds and private equity funds:

- Banking entities must not exceed **3%** of the total of the ownership interests in hedge funds and private equity funds.
- The total of all investments in hedge and private equity funds may not exceed 3% of the entity's Tier 1 equity.

It regulates a banking entity's transactions prohibiting an asset purchase or sale transaction with an executive officer, director, or principal shareholder other than on market terms and the transaction must be pre-approved when it exceeds 10% of the capital stock and surplus of the depository institution.

Title VII – Wall Street Transparency and Accountability

This title regulates trading involving swaps, including credit default swaps and credit derivatives, requiring those that are currently traded over-the-counter (OTC) to be cleared through exchanges or clearinghouses that are registered with the SEC. The clearing organization is required to submit the swap to the SEC, which will determine whether or not clearing is required. The SEC will consider whether or not to exempt depository institutions, farm credit system institutions, and credit unions with total assets of $10 billion or less.

The title defines swaps broadly to include options, many forward contracts, and other transactions not formerly considered derivatives.

Companies using swaps OTC could only net them in their balance sheet by counterparty. Using swaps through clearinghouses, companies will be able to net them by clearinghouse; i.e., companies will likely be able to net far more swaps.

The title also prohibits any federal assistance to a swap entity unless its involvement in swaps is limited to hedging activities or acting as a swaps entity for certain permissible swaps, which excludes credit default swaps.

Title VIII – Payment, Clearing, and Settlement Supervision

The objectives of this title are to mitigate systemic risks in the U.S. financial system and promote financial stability by authorizing the Board of Governors of the FDIC to establish uniform standards for management of risk and conduct of payment, clearing, and settlement activities by financial institutions when they are systemically important (SIFIs).

It also gives the Board of governors an enhanced role in the supervision of the standards and in strengthening the liquidity of financial market utilities that are systemically important.

Title IX – Investor Protections and Improvements to the Regulation of Securities

This title, which includes 10 subtitles, requires various studies to enable revisions to the authority and structure of certain participants in the financial markets and the relationships among them, including the SEC and credit rating agencies and the relationship between customers and broker-dealers or investment advisers.

The **10 subtitles** are:

- *Increasing Investor Protection* – Establishes the Office of the Investor Advocate and authorizes the SEC to require a *fiduciary duty* by broker-dealers to customers (i.e., for recommendations to be in the customers' best interests).
- *Increasing Regulatory Enforcement and Remedies* – Created a "*whistleblower bounty program*" which allows someone who provides information which leads to a successful SEC enforcement to receive 10% to 30% of the monetary sanctions over $1 million.
- *Improvements to the Regulation of Credit Rating Agencies* – Requires the SEC to establish an Office of Credit Ratings to oversee nationally recognized statistical rating organizations (NRSRO) and enhances the regulation of NRSROs, including a requirement to establish, maintain, enforce, and document effective internal control and report on it annually. It also prohibits linking the compensation of the compliance officer to the financial results of the NRSRO.
- *Improvements to the Securitization Process* – In securitizations, a securitizer (e.g., an investment bank) buys many individual assets (e.g., mortgages) from various individual lenders (e.g., commercial banks). The securitizer next sells securities to investors that are backed by the payments resulting from the "pool" of assets (hence the term asset-backed securities (ABS). Dodd-Frank requires lenders to retain an economic interest of at least *5% (skin in the game*) for assets they sell to securitizers, unless the assets meet safe harbor provisions (e.g., qualified residential mortgages, QRM). Mortgages meeting the standards of government-sponsored securitizers (Fannie Mae and Freddie Mae) will qualify as QRMs. When the safe harbor provisions are not met, the rules for determining how much of securitized assets to continue to include in companies' balance sheets are complex.
- *Accountability and Executive Compensation* – Requires a nonbinding shareholder vote every 3 years to approve executive compensation (say on pay) and every 6 years to affirm that a vote every 3 years is frequent enough. It requires that members of the compensation committee be independent directors and it also requires the entity provide shareholders information about the relationship of executive compensation and:
    - Entity performance

- Average compensation of nonexecutive employees

Companies larger than $1 billion in assets receive incentives to make managerial compensation less sensitive to short-term performance, using longer performance periods, and delaying some compensation until after those periods.

Financial institutions larger than $50 billion in assets are required to defer at least 50% of annual incentive-based compensation for at least 3 years.

Disclosure of security hedging activities of employees and directors is required. Although it is not binding, shareholders are also entitled to vote to disapprove any "golden parachute" arrangement.

In addition, stock exchanges are required to establish "**claw back**" provisions requiring the recovery of *executive compensation* when an entity has an accounting restatement.

- *Improvements to the* Management *of the Securities and Exchange Commission* – Gives employees a way to report problems with the SEC.
- *Strengthening* Corporate *Governance* – Authorizes the SEC to allow shareholders to make nominations to the board of directors by proxy. Also requires disclosure of reasons for the Chairman and CEO being the same individual if that is the case. Companies **must** alternately disclose why, if the Chairman and CEO are **different** individuals, the reasons why.
- *Municipal Securities* – Creates a guarantee of trust with municipal advisors (a municipal advisor provides investment advice to state and local governments) who must also register with the SEC.
- *Public Company Accounting Oversight Board, Portfolio Margining, and Other Matters* – Allows the SEC to authorize rules, as necessary with respect to securities for borrowing.
- Securities and Exchange Commission Match Funding – Changes the way the SEC is funded.

Title X – Bureau of Consumer Financial Protection

This title creates the Bureau of Consumer Financial Protection (more commonly known as the *Consumer Financial Protection Board, CFPB*) regulate financial products and services sold to the consumer (e.g., credit counseling, check-cashing, etc.) and oversees, among other things, fair lending. The Bureau is an independent unit located inside and financed by the Federal Reserve.

Title XI – Federal Reserve System Provisions

Requires the GAO to audit the Fed and requires the Fed to regulate institutions they oversee through the development of prudent standards regarding such matters as liquidity and risk management. It also requires that off-balance sheet financing be taken into consideration when evaluating compliance with capital requirements.

Title XII – Improving Access to Mainstream Financial Institutions

This title indicates its objective "is to encourage initiatives for financial products and services that are appropriate and accessible for millions of Americans who are not fully incorporated into the

financial mainstream." Through grants, cooperative agreements, and other arrangements, the Secretary of the Treasury is to promote programs:

- Enabling low to moderate income individuals to establish accounts in federally insured depository institutions;
- Providing low cost small loans to consumers; and
- Providing financial literacy and education opportunities.

Title XIII – Pay it Back Act

This title was designed to recapture any unspent funds that were committed as part of a stimulus package and use them for deficit reduction. It reduces funds available for TARP (Troubled Asset Relief Program) from $700 billion to $475 billion and requires that proceeds from the sale of securities issued by Government-Sponsored Enterprises that became owned by the Treasury be used for deficit reduction.

Title XIV – Mortgage Reform and Anti-Predatory Lending Act

This title creates standards related to residential mortgage loan organizations, mortgages, high-cost mortgages, mortgage servicing, and appraisal services that are overseen by the Bureau of Consumer Financial Protection.

Title XV – Miscellaneous Provisions

This title requires the SEC to pass rules requiring issuers of securities to provide disclosures as to (1) whether they use "conflict minerals" (e.g., gold, cassiterite (tin ore), etc.), (2) whether the minerals were imported from the Democratic Republic of Congo or adjoining countries, and (3) their due diligence about the chain of custody of those materials.

Title XVI – Section 1256 Contracts

This title excludes securities futures contracts and swap forms of derivatives from section 1256 contracts for purposes of calculating capital gains and losses.

Lecture 3.06 – Inventory Management

Budgeting for inventory purchase decisions involves determining when to place orders (or start production) to replace inventory, and how much to purchase (or produce). Managing inventories requires weighing many potentially conflicting factors. Higher costs of carrying inventories would push businesses to reduce inventories to the extent possible. Higher costs of placing small orders would likely push businesses to make fewer but larger orders, which would likely increase their inventories. Longer lead times in the delivery of inventories would push businesses to carry larger inventories to avoid running out of products to sell. Higher sales are also typically associated with higher inventory needs.

Materials Requirements Planning (**MRP**) is a computerized system that uses demand forecasts to manage the production of finished goods and the required inventory levels for various raw materials.

Deciding when to order involves calculating the **reorder point**. To do so, the business determines the quantity used per day and the lead time needed for orders to be filled. For example, if the company uses 25 units per day, and an order normally takes 10 days to fill, then an order should be placed, at the latest, when the inventory consists of 25 × 10 = 250 units. Of course, the time it takes to fill an order may vary somewhat, so businesses often use the maximum lead time rather than normal lead time to determine when to place orders. The difference between the two inventory levels is known as the **safety stock**. If, in the above case, the maximum lead time is 15 days, then an order might be placed when there are 25 × 15 = 375 units remaining, and the safety stock is 375 – 250 = 125 units.

Reorder point

Average daily demand
× average lead time
= reorder point without a safety stock
+ safety stock
= reorder point with a safety stock

Businesses may decide the appropriate quantity to order based on a calculation called the **economic order quantity** (EOQ). The formula (which is obtained using calculus) takes into account the Annual Usage of inventory (A), costs involved in Placing orders (P), and Storage costs for carrying inventory (S):

$$EOQ = \sqrt{\frac{2 \times A \times P}{S}}$$

A = Annual Usage of inventory
P = Cost of Placing an order
S = Cost of Storing or carrying an individual unit of inventory for one period, obsolescence cost

If the annual usage of the product is 100 units, it costs $4 to process each order, and $8 to store each unit of inventory for a year, then:

$$EOQ = \sqrt{\frac{2 \times 100 \times 4}{8}} = \sqrt{100} = 10\ units$$

Some companies follow a **just-in-time (JIT)** philosophy to manage their inventories. To keep their inventories low, these businesses order as little as possible and order as close to the time when inventories are needed as possible. JIT may be used effectively when (1) the costs of storing (non-value-adding operations) inventory are high, (2) lead times are low, (3) needs for safety stock are low because of having good relationships with suppliers who are very reliable, and (4) costs per purchase order are also low. Under JIT, goods are produced on demand rather than based on long-range forecasts of sales.

In a mature JIT system, units are in process for a relatively short period of time due to the efficiency of the system and the higher speed of manufacturing. As a result, traditional accounting approaches for keeping track of costs in work-in-process are not effective and many companies adopt a *backflush costing* approach.

In a backflush costing approach, costs assigned to jobs will not be tracked in as much detail as in traditional costing systems. Under a **backflush approach** (Delayed or Endpoint costing)**:**

- All manufacturing costs are charged directly to cost of goods sold since little or no inventory is expected to remain at any point in time.
- At the end of an accounting period, the company determines if there are inventories.
- When inventories exist on a reporting date, costs are allocated from cost of goods sold into the appropriate inventory accounts, such as finished goods using standard costs.

Businesses use a wide variety of techniques to manage and assess (audit) their inventories. For instance, traditional "physical inventories" involve counting all actual inventories on a specific date (often requiring production to stop temporarily). In contrast, "cycle counting" focuses on counting small subsets of inventory in specific locations.

Inventory Turnover Ratio = $\frac{COGS}{Average\ Inventory}$

- Remember to use cost of goods sold and **not** sales.

Number of days of supply in average inventory = $\frac{360}{Inventory\ Turnover}$

Lecture 3.09 – Capital Budgeting

Businesses use **capital budgeting** techniques to make long-term investment decisions. For instance, businesses use discounted cash flow techniques to determine the present value (today) of future cash returns from various possible competing investments or projects. While all capital budgeting methods are based on uncertain predictions of future income or cash flows, capital budgeting may be used to help select the most profitable or best investment alternative based on the, unavoidably limited, information available. The CPA exam likes to test *4 techniques*:

- Payback period
- Internal (time adjusted) rate of return (IRR)
- Accounting rate of return
- Net present value (NPV)

Maturity matching (or the self-liquidating approach) to financing assets involves matching asset and liability maturities.

Capital Budgeting Techniques

$$\textbf{Payback period} = \frac{\text{Initial investment}}{\text{After Tax Annual Net Cash Inflows}} = \text{\# years}$$

$$\textbf{IRR: } PV\ Factor = \frac{\text{Investment}}{\text{Annual Cash Flows}}$$

$$\textbf{Accounting Rate of Return} = \frac{\text{Accounting Income}}{\text{Avg. Investment}} = ROI$$

$$\textbf{NPV} = \text{PV Cash inflows} - \text{PV Cash outflows} = \text{Net PV}$$

If + good
If – bad

Payback Period

Payback Period is the length of time it takes for an initial cash outlay for the investment to be recovered in cash. Net cash flows are not the same as income, since depreciation is not subtracted in the determination of net cash flows. If the net cash flows are the same each year, then the payback period equals the initial investment divided by the annual net cash inflow. If cash flow is uneven, start with the initial investment, and then subtract each year's cash inflow until the entire investment has been recovered.

Some *disadvantages* of the payback period are that it does not take into account either the project's total profitability or the time value of money. The ***discounted payback method*** uses the present value of each individual annual net cash flow.

Payback period = Initial investment / After tax net cash inflows

Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is the discount rate at which the net present value is zero. Alternatively, the IRR is the rate of interest that equates the present value of cash outflows (commonly referred to, simply, as the project's initial costs) and the present value of cash inflows. It can be used to compare alternative investments. It is also known as the *time-adjusted rate of return* from an investment.

IRR: PV factor = Investment/annual cash flows

If a business has the funds in hand to launch all the projects that managers were potentially considering (e.g., if the firm has outside holdings of cash or marketable securities), capital budgeting may lead the business to conclude that not all projects should be launched. The business could compare the calculated internal rate of return on each project to pre-specified **hurdle rates** that the business sets as its minimum acceptable rates of return. Businesses may set several hurdle rates based on market rates of return for projects with similar risk. Accept projects only if the IRR is greater than the hurdle rate, otherwise reject the project. Businesses commonly use the weighted-average cost of capital (WACC, see below) as the hurdle rate against which they compare projects' IRRs to decide whether to undertake those projects.

Some *advantages* of using IRRs are:

- They take into account the time value of money.
- Hurdle rates may take into account rates of return on investments with similar risk.
- Many practitioners and audiences find IRRs to be more readily understandable than net present values.

Some *disadvantages* of IRRs are:

- Under different assumptions, some cash flow patterns may actually yield multiple IRRs.
- Some cash flow patterns may not have an IRR for which the project's NPV equates to zero.

Accounting Rate of Return (ARR)

The Accounting Rate of Return (ARR) computes an approximate rate of return that does not take into account the time value of money and does not use actual cash flows. ARR is calculated dividing accounting income by the investment. Accounting income is net of all expenses, *including depreciation and income taxes.* The investment usually refers to the initial investment, but occasionally the exam requires the use of the average book value of the investment each year. In the first year, average book value is the initial investment reduced by one-half year of depreciation.

For example, if an asset costs $1,000, has a 5-year life, no salvage value, and straight-line depreciation is used, depreciation in the first year will be $1,000/5, or $200. The book value at the beginning of the year would be the cost of $1,000. At the end of the year, book value would be $1,000 - $200, or $800. As a result, average book value in the first year is ($1,000 + $800) × ½ = $900.

ARR = Accounting income / Average (or initial) investment

Since ARRs have the a*dvantage* of being easy to compute and understand, they are often used to rate managerial performance (simple and intuitive).

Some *disadvantages* of ARRs are:

- ARRs do not take into account the time value of money.
- ARRs do not take into account differences in risk across investments (no project risk).
- Using different depreciation methods yields different ARRs.

Net Present Value (NPV)

Net Present Value (NPV) is the excess of the present value of the cash inflows over the present value of the outflows (typically the investment today). The time value discount rate used is known as the *hurdle rate* of return or cost of capital, and represents the minimum rate of return the company is willing to accept on an investment. A project that earns the hurdle rate of return has an NPV = 0. NPV > 0 means the project earns more than the hurdle rate.

NPV = (Present value of future cash flows – Required investment)

NPVs are the most accepted approach to compare projects financially. Some *advantages* of NPVs are

- NPVs take into account the time value of money.
- NPVs may take into account risk, using higher discount rates for riskier projects.
- NPVs take into account total profitability.
- NPVs yield results in dollars, which may be readily interpreted as the changes in owners' wealth if a project is carried out.

Some *disadvantages* of NPVs are:

- NPVs require more involved computations (not simple and intuitive).
- Some audiences may understand NPVs less readily.
- NPVs do not take into account that managers may not actually follow the originally scheduled investments (or expenses).

Of course, IRRs and NPVs are ultimately different ways to express the same concept. If a project returns more (less) than its discount or hurdle rate, it has a positive (negative) NPV. Summarizing:

NPV	***IRR***
NPV > 0	IRR > Discount or hurdle rate
NPV = 0	IRR = Discount or hurdle rate
NPV < 0	IRR < Discount or hurdle rate

The **excess present value index (or profitability index)** is the ratio of the present value of cash inflows to the initial cost of a project. When businesses are faced with several potential projects with positive NPVs, but do not have the funds to carry out all of them, they may use this index to choose which projects to carry out first. If the ratio is > 1.0, then the NPV is positive. To calculate, divide the present value of the annual after-tax cash flows by the original cash invested in the project.

For example, assume a business is considering buying a machine, and has the following information:

Cost	$900
Useful life	5 years
Salvage value	NONE
Depreciation method	Straight-line
Annual depreciation	$180
Annual net cash flow	$250
Hurdle rate of return	10%

In addition, present value information is available for a 5-year ordinary annuity:

Rate	10%	11%	12%	13%
Factor	3.79	3.70	3.60	3.52

The **accounting rate of return** on the original investment is:

Income / Investment = ($250 - $180) / $900 = $70 / $900 = **7.78%**

The **payback period** is:

Investment / Annual cash flow = $900 / $250 = **3.6 years**

The **net present value** at the 10% hurdle rate of return is:

	Cash	**PV Factor**	**Present Value**
Inflows	250	3.79	948
Outflows	900	1.00	900
Net			**48**

The **internal rate of return** is the rate at which the present value of the annual cash inflows of $250 equals the investment of $900, and this occurs when the present value factor for the annuity is $900 / $250 = 3.6, at **12%**. Notice that the net present value at 12% is zero:

	Cash	**PV Factor**	**Present Value**
Inflows	250	3.60	900
Outflows	900	1.00	900
Net			-0-

Depreciation Tax Shield

When determining cash outflows and inflows for payback, NPV, and IRR analysis, the effect of depreciation expense on cash flows must be considered if the given information starts with net income, rather than cash inflows and outflows. (Presumably, income from all projects will be taxed at the same marginal rates.) While depreciation is not a cash expense, it affects the cash paid for taxes (i.e., it produces tax savings).

For example, assume estimated annual net income before taxes from a project is $100,000; the estimated annual depreciation expense is $30,000; and the estimated marginal tax rate is 40%. The estimated annual taxes are 0.40 × $100,000 NI = $40,000. Thus, the estimated annual cash inflow is equal to net income before taxes with the non-cash expense of depreciation added back, less taxes: $100,000 NI + $30,000 dep. - $40,000 taxes = $90,000 inflow. Without the depreciation deduction, annual taxes would be 0.40 × ($100,000 + $30,000) = $52,000 taxes; thus, the cash inflow would be $100,000 NI + $30,000 dep. - $52,000 taxes = $78,000 inflow.

The $12,000 difference between the tax amounts with the depreciation deduction versus without the depreciation deduction is called the depreciation tax shield. In other words, the non-cash expense shields what would otherwise be taxable income, resulting in a reduced cash outflow for taxes. The depreciation tax shield can be simply calculated as the tax rate × depreciation (in our example, 0.40 × $30,000 dep. = $12,000.)

We meet this tax shield concept again when considering the debt/equity mix for a business. Interest expense is tax deductible, but dividends are not.

Mutually Exclusive, Dependent, or Independent

Projects may be classified by whether they are mutually exclusive, dependent, or independent.

- **Mutually exclusive**—the entity can implement only one of two or more projects. For instance, a company owns a restaurant with a kitchen not in compliance with the health code and an outdated, but operable, dining area. The entity can either sell the property or upgrade the kitchen and open the restaurant for business, but not both.
- **Dependent**—a dependent project's cash flows are influenced by another project. For instance, a company owns a restaurant with a kitchen not in compliance with the health code and an outdated, but operable, dining area. Redecorating the dining area of the restaurant is dependent on upgrading the kitchen to meet minimum health and safety standards since without an operable kitchen, the dining area will not have cash flows. In this situation, redecorating the dining area of the restaurant is a project dependent on updating the kitchen.
- **Independent**—the entity can implement an independent project regardless of the status of the other projects. For instance, assuming sufficient resources, opening restaurants in two different cities are independent projects.

In a sense, all projects are mutually exclusive as capital to be invested is limited. The NPV, IRR, and profitability index (a refinement of the NPV method) readily accommodate ranking mutually exclusive projects. When conflicts between NPV and IRR exist, the NPV ranking generally is more reliable as it does not assume that project earnings are reinvested at the same rate that the project earns.

Project Nature

Projects also may be classified by the nature of the projects. Entities may require less analysis for projects of some natures than for others. Low-analysis projects typically include mandated projects. High-analysis projects typically include development of a new product with unknown market demand. Categories include: maintenance-of-business replacements, cost reduction replacements, expansion of existing projects or markets, development of new projects or markets, mandated (such as by license, safety, or environment regulations) projects, strategic (providing differentiation from competitors, etc.), and other (mixed-purpose projects for which deciding on a category exceeds any benefit).

Forecasting

Businesses use forecasting techniques to develop projections of the environment in which they will operate in the future, including (1) economy-wide conditions such as interest rates, inflation, unemployment, economic growth, retail sales etc., (2) conditions in their sector of the economy such as sector-specific sales and prices, and (3) cash flows specific to the business, to specific subsidiaries, and to existing and proposed projects, etc.

Interpolation involves using available data to "fill in gaps" in data relevant to a business. For instance, if a business has reliable data that customers with credit scores in the 500-520 range have loan delinquency rates of 10% and customers with credit scores in the 540-560 range have loan delinquency rates of 8%, then interpolation might lead a business to forecast, project, assume, and/or conclude that customers with credit scores in the 520-540 range would have loan delinquency rates of about 9%.

Extrapolation involves using available data to make projections outside the range for which there is available data. Continuing with the earlier example, using the relationship between credit scores and loan delinquencies, a simple extrapolation would conclude that customers with credit scores in the 480-500 range would have delinquency rates of 11% and customers with credit scores in the 460-480 range would have delinquency rates of 12%.

In general, the results from interpolation are far more reliable than those for extrapolation. In addition, extrapolation becomes less reliable the further one moves from the range of actual data. However, the precise boundary between interpolation and extrapolation is often quite blurred. For instance, a company with retail outlets in many cities and data about both sales in each outlet and city characteristics might use forecasting techniques to project what sales might be in a retail outlet in a new city. This projection could be considered interpolation if the new city falls within the range of the characteristics of many cities where the business already operates. The projection could be considered extrapolation if the city is in a region, or country, where the business has little experience.

Univariate forecasting involves focusing on the past relationship between only one variable to be projected (e.g., delinquency rates) and actual (or projected) values for only one other variable (e.g., credit scores). **Multivariate forecasting** uses the past relationships between the variable to be projected (e.g., delinquency rates) and more than one other variable (e.g., credit scores, income, change in income, wealth, marital status, seasonal adjustments, etc.). Forecasting techniques typically employ variations of regression analysis techniques described elsewhere in this book.

While forecasting techniques may be more or less computationally sophisticated, ultimately, they involve determining past relationships among various variables and making projections based on the assumption that past relationships will continue and/or specific judgments of how some

particular variables might behave in the future. As a consequence, forecasts (e.g., economy-wide ones) tend to be most accurate when economic conditions are most stable, and routinely miss turning points in business cycles, i.e., they commonly fail to predict recessions and often under predict the strength of recoveries. To a large extent, most forecasting techniques largely involve extrapolation assuming that ongoing **trends** will continue.

Some forecasting techniques seek to combine both the principles of **momentum**, i.e., that short-term trends will continue, and **mean reversion**, i.e., that deviations from long-term patterns will eventually be corrected. House prices provide an example of momentum and mean reversion in practice. Over short periods, if house prices are climbing (or falling) quickly, one may readily expect that pattern to continue. For instance, climbing prices may provide other potential buyers to also buy, pushing prices further up. Eventually, however, if prices become too high, younger families may find prices too high for their income, and/or lenders may find it too risky to engage in further lending, leading to a period of falling prices (a reversion of prices from high levels closer to their long-term means). While analysts may theoretically understand that momentum eventually runs out and that mean reversion takes place, existing forecasting techniques are very far from being able to determine when mean reversions will take place.

To address the common shortcomings in forecasts, some forecasters provide not only a "central" forecast (e.g., inflation will most likely be 2%), but also a range of possible values and probabilities for the various values (e.g., there might be a 10% probability of inflation below 0%, a 20% probability of inflation between 0% and 1%, a 40% probability of inflation between 1% and 3%. a 20% probability of inflation between 3% and 10%, and a 10% probability of inflation higher than 10%).

Risk Analysis

When applying capital budgeting techniques to evaluate whether or not to accept a project, one factor to consider is the risk associated with that project. Risk analysis involves identifying risks that might impair the ability of the entity to achieve the expected results from a particular project and estimating the probability that the risk will actually have an adverse effect and measuring the expected amount of the increase in cost, or reduction in return that will be experienced.

For example, the entity may be considering a project involving the acquisition of a piece of equipment that has a reputation for failing periodically. The entity will estimate the probability that the equipment will fail, estimate the additional cost that will be incurred as a result of the failure, and multiply the probability by the amount to estimate the expected value.

A company, for instance, may determine that there is a 25% probability that a machine's engine will fail, requiring an overhaul that is expected to cost $10,000. The expected cost of this **risk event** would be $10,000 × 25%, or $2,500.

Investment Life Cycle

When evaluating an investment's rate of return, all phases of the investment life cycle will be considered as will such factors as acquisition cost, the cost of managing the investment, cash flows, appreciation, deprecation, and costs of disposal.

When an entity makes an investment, the actions it takes over the period during which it is involved with the investment is considered the **investment life cycle**.

Pre-commitment Evaluation: An entity plans for the acquisition of an investment, including the evaluation as to whether or not the investment is likely to meet the entity's investing criteria. This includes the investment's cost, volatility, expected return, and whatever other factors the entity considers when comparing investments.

Acquisition of investment

Management: Manage the investment with an emphasis on growth, earnings, tax benefits, cash flows, or some other factor relevant to the entity. Some investments (such as ownership of a business, product line, or division) require ongoing decisions; others (such as a U.S. Treasury bond) are more passive.

Monitoring: Re-evaluate the investment to determine if there are diminishing returns, suggesting the investment either no longer meets the criteria or may no longer be the best alternative.

Disposal of investment

Product Life Cycle

A product's life cycle is from the time it is introduced to the time when it is withdrawn. Not all products make it to all phases. For instance, some go from introduction to decline.

Introduction

Few and intermittent sales.

- Limited production capacity
- Lack of appropriate retail outlets
- Consumer resistance to change to the established consumption patterns

Highest proportional promotional expenses: Small volume of sales to offset high promotion efforts to create demand.

- Informing potential and present consumers of the new and unknown product
- Inducing a trial of the product
- Screening distribution net-work

Highest product prices possible.

- Low volume to absorb fixed costs
- Technological problems not fully resolved
- Few or no competitors
- Sales to higher income groups/first adopters

Growth

Sales rise as consumers accept the product. The prices may remain high to recover some of the development costs. High profits encourage competitors to enter the market.

Sales accelerate.

- Consumer resistance fades
- Distribution network solidifies
- Production is optimized

High promotional expenses.

- Shift from informing consumer to brand identification
- Special offers to consumers or allowances to dealers

Product improvements.

- Competitors do not incur the same extent of research and development or promotional costs as the originator.
- Competitors or originator gain advantage by modifying products.
- Competitors or originator gain advantage by reducing prices.

Maturity

Sales accelerate at a declining rate.

- Market reaches saturation.
- Prices soften and become more uniform.
- Competition intensifies as each manufacturer tries to maintain production at a viable level.
    - The more capital-intensive the product is to produce, the more important it is to maintain high output to cover fixed costs at lower prices.
    - The Internet has lengthened the life cycle for many products.

Normal promotional expenses as competition squeezes margins. Manufacturers try to "milk the cash cow" for all it is worth.

Extension strategies: Substantial product modification can have the revised product re-enter the introduction phase to re-start the cycle.

- Development of new markets for existing product
- Development of new uses for existing product
- Development of more frequent use for existing product
- Development of wider range of products (more flavors, colors, etc.)
- Development of style change (slightly different product)

Decline

Sales decline rapidly.

- Prices fall
- Over capacity pushes manufacturers to cease production
- Conceivably, this could be a very profitable period for a producer with low fixed costs.

Little or no promotional expenses.

Lecture 3.13 – Long-Term Debt Management

Private Debt (variable interest) includes business obligations that may not be readily resold to (i.e., traded with) the general public. Private debt largely includes loans from banks, other financial institutions, or from syndicates of lenders. Most business loans have variable interest rates that are set at a premium over some base rate or ***index***. Some businesses may also sell bonds to qualified (i.e., large or sophisticated) investors in "private placements" that may not be readily traded to other parties.

- The **Prime Rate** is the rate that each lender charges its most creditworthy customers. Since the mid-1990's, most banks have set their prime rates 3% above the federal funds rate. Other business customers may obtain loans at some premium above the prime rate (e.g., Prime plus 2%).
- The **London Interbank Offered Rate (LIBOR)** is also a common base rate for many business (and consumer) loans both abroad and in the U.S. LIBOR computes rates for many (short) maturities and currencies, including the U.S. dollar.

Public Debt (fixed interest) includes business obligations that may be readily resold (i.e., traded with) the general public in markets (e.g., exchanges) that the **Securities and Exchange Commission (SEC)** regulates. Public debt largely includes bonds that, typically large, corporations may issue directly to retail and institutional investors. Issuing bonds permits corporations to borrow from sources other than banks, paying interest rates that may be fixed and, depending on their credit history, may actually be lower than those that banks would charge.

- **Eurobonds** are bonds denominated in U.S. dollars that are sold abroad (i.e., despite their name, not only in Europe). Some countries have less stringent registration and disclosure requirements than those of the SEC.

Debt Covenants

To convince lenders, or investors, to lend, borrowers often agree to restrictions on their financial behavior or debt covenants.

Positive covenants stipulate what the *borrower must do* and might involve:

- Providing annual audited financial statements to the lender.
- Maintaining various financial ratios within preset parameters, e.g., a minimum ratio of current assets to current liabilities.
- Maintaining life insurance policies for officers or key employees of the company.

Negative covenants stipulate what the *borrower may not do* and might involve:

- Not borrowing additional sums during the time period from other lenders.
- Not selling various listed assets of the business.
- Not exceeding certain levels of dividend payments to shareholders.
- Not exceeding certain compensation limits for executives.

Secured and Unsecured Bonds

Debt obligations may be secured by certain collateral or may specifically be placed behind other forms of debt in the priority of repayment. For instance, larger firms sometimes float public debt offerings collateralized by the firms' accounts receivable. The creation of such asset-backed

securities is sometimes called **securitization of assets**. In roughly declining order of safety (and increasing order of interest rate), there are:

- **Mortgage bonds** are secured by real estate owned by the borrower.
- **Collateral trust bonds** are secured by financial assets owned by the borrower.
- **Debentures** are unsecured bonds.
- **Subordinated Debentures** are unsecured bonds that, in a liquidation of the business, receive any repayments only after all other more senior creditors have been paid in full.
- **Income bonds** make interest payments only if the business has earnings in excess of some preset level.

Provisions Affecting the Repayment of Bonds

- **Term bonds:** the face value is repaid on a single maturity date.
- **Serial bonds:** a fraction of the face value is repaid on several dates (installments) throughout the life of the bond (e.g., every year for a 10-year bond).
- **Sinking funds:** Throughout the life of the bond, the borrower sets funds aside to cover the repayment of the face value of the bond.
- **Convertible bonds:** The bondholder may convert the bonds to the common stock of the company as repayment instead of holding them to maturity.
- **Redeemable bonds:** The bondholder may demand repayment in advance of the normal maturity date should certain events occur (such as the buyout of the company by another firm).
- **Callable bonds –** The borrower may repay the bondholders before the normal maturity date (force to redeem). As compensation for early redemptions, call provisions require borrowers to repay bondholders some premium over the face value of the bond.

Bond Interest Rates

- **Stated rate –** The fixed interest payment calculated from the face value of the bond. It is also known as the **coupon rate, face rate,** or **nominal rate.**
- **Current yield –** The fixed interest payment divided by the current selling price of the bond. When the bond is trading at a discount, the current yield will be higher than the stated rate, and when the bond is trading at a premium, the current yield will be lower than the stated rate. The current yield should be interpreted with some caution, since it reports the interest payment as a percentage of the current price, not taking into account the fact that the principal repayment of the bond will not be the current selling price, but the face value.

$$\frac{\textit{Annual interest paid}}{\textit{Bond market price}} = \textbf{\textit{Current Yield}}$$

- **Yield to maturity –** The interest rate at which the present value of the cash flows of interest and principal will equal the current selling price of a bond. For a bond selling at a discount, yield to maturity will be higher than the current yield, since it accounts for the "bonus" interest payments reflected in the discount. For a bond selling at a premium, yield to maturity will be lower than the current yield, since it reflects the loss of the premium

when the face value is repaid. Yield to maturity is also known as the **effective rate** or **market rate.** The formula for calculating the **Effective Annual Interest** rate (**EAR**) is:

$$EAR = (1+r/m)^{m} - 1$$

r = Stated interest rate

m = compounding frequency

- The **yield curve** illustrates the relationship between short- and long-term interest rates. These relationships are important in determining whether to use long-term fixed or variable rate financing.
- The price of a bond depends on the economy-wide, risk-free interest rate and the credit risk involved in that bond. Bond rating agencies analyze bonds to assess their credit risk. *Some of the credit risk categories, as rated by Moody's investor service,* include:

Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C
Lowest Risk							*Highest Risk*	
(Investment grade)				*(Speculative grade, junk, or high yield)*				

To calculate the **Present Value (PV) of the proceeds** for a bond, two amounts need to be PV'd.

- **PV of the Face Value** of the bonds (Face value × PV of a lump sum using the Effective interest rate)
- **PV of the interest payments** as an annuity (Face value × stated rate × time = interest × PV of an ordinary annuity at the effective interest rate)
  - The sum of these two amounts represents the PV of the bond.
  - If semi-annual interest is being paid, take the years × 2 and the interest rate/2
    - Ex. 5 yr bonds at 10% semi-annual. Use the PV table for 10 periods @ 5%.

Let's assume a Bond with a stated rate of interest of 8% and a market rate of 10% was issued. Because the stated rate of 8% is lower than the market rate (Yield/Effective rate) of 10%, the only reason someone would purchase this bond is if the bond effectively yields 10%. In order to do so, the issuer must sell the bond at a **DISCOUNT** (the actual cash proceeds must be precisely computed using present value factors and are only estimated in this journal entry)**.**

Cash	900,000	
Discount	100,000	
Bonds Payable		1,000,000

The **discount must be amortized** over the life of the bond. Let's assume we are using straight-line amortization of $20,000 year (100/5yrs=20).

Interest expense	100,000 (10%)		
Discount		20,000	
Cash		80,000	(8%)

Variations on Bond Interest

Zero-coupon bonds do not make coupon payments but only pay the face value on the date of maturity. A common example of zero-coupon bonds are short-term U.S. *Treasury Bills*. Zero-coupon bonds *sell at a discount*, with the return to be bondholders arising from the difference between the price at which the bond is bought and the face value paid at maturity.

Floating rate bonds do not have fixed coupon payments. Payments instead fluctuate with some general index of interest rates. In **reverse floaters,** payments actually increase when the general interested rate index goes down and payments decrease when the index goes up. These unusual bonds are one more tool through which businesses may hedge their interest-rate risks.

Registered bonds use a register in which the borrower has the names and addresses of bondholders, such that the borrower may send payments directly to the bondholders (i.e., not through a broker). In such cases, an actual bond certificate will usually not be issued.

Junk (high yield, or speculative grade) bonds are those issued by companies that credit rating agencies assess as more likely to default, and thus pay much higher interest rates. In the ratings of Moody's Investors Service, bonds with ratings lower than Baa are considered junk bonds. Some bonds are initially issued as investment-grade bonds but are subsequently downgraded to junk bonds.

Foreign bonds have interest and face value payments in another currency.

Lecture 3.17 – Cost of Capital

A business's cost of capital is the average of the costs of its debt and equity (including preferred stock, common stock, and retained earnings), each weighted by its market value. These costs are expressed as percentages per annum.

The word *capital* can have different meanings in different contexts. In some contexts (e.g., bank regulation), capital is roughly equivalent to equity and excludes most liabilities (e.g., deposits and senior bonds). In the context of calculations of the cost of capital, project selection, etc., capital means all sources of funds, including both debt and equity.

The **Cost of Debt** financing is the after-tax cost of interest payments as measured by yields to maturity. It can be calculated in *two ways*:

- Yield to maturity × (1 – effective tax rate)
- (Interest expense – Tax deduction for interest) / Carrying value of debt

The **Cost of Preferred stock** financing is the stipulated dividend divided by the net issue price of the stock.

- Cost of Preferred stock = *Dividend/Net issue price*

The **Cost of *Existing* Common stock (equity)** financing represents the expected returns of common shareholders, and is difficult to estimate. Some techniques:

- The **Capital Asset Pricing Model (CAPM) (Security Market Line),** assumes that the expected return of a particular stock depends on its *volatility* relative to the overall stock market *(beta)* (describes relationship between risk and expected return).
  CAPM = *(Beta × Excess of Normal Market Return over Risk Free Investments)* + *Return on Risk Free Investments.*
    - The **Beta coefficient** of an individual stock is the correlation between changes in the stock's price and changes in the price of the overall market. If, for example, the market goes up 5% and the individual stock's price goes up 10%, the stock's beta coefficient is 2.0.
    - **CAPM** = Risk free rate + [(expected market rate – risk free rate) × Beta]
- The **Arbitrage Pricing Model** is a more detailed version of CAPM that uses separate excess returns and betas for various factors contributing to a stock performance.
- The **Bond Yield Plus** method is based on the historical relationship between equities and debt and, thus, simply adds 3% to 5% to the interest rate on the business's long-term debt.
- The **Dividend Yield plus Growth Rate** method adds the current dividend (as a percentage of the stock price) and the expected growth rate in earnings.

$$\frac{\textit{Next expected dividend}}{\textit{Current stock price}} + \textit{expected growth in earnings} = \textbf{Dividend Yield Plus Growth Rate}$$

The **Cost of *New* Common stock** is a little higher than that of existing stock, since the business must recover the cost of issuing the new shares (selling or flotation costs).

$$\frac{\textit{Next expected dividend}}{\textit{(Current stock price – flotation costs)}} + \textit{expected growth in earnings} = \textbf{Cost of } \textbf{\textit{new}} \textbf{ Common stock}$$

The **Weighted average cost of capital (WACC)** is a calculation of a firm's effective cost of capital taking into account the portion of its capital that was obtained as debt, preferred stock, and common stock. Businesses with capital structures that result in low WACCs have lower required rates of return, or hurdle rates, and are more likely to find projects that add to shareholder wealth. Therefore, businesses seek capital structures that minimize their WACC.

The optimal capital structure for a business involves a tradeoff between the fact that equity is typically higher cost than debt, and the fact that higher debt-to-asset ratios result in higher interest rates for an individual business. Thus, at very low debt-to-asset ratios, businesses may make their capital structure more optimal (reduce their WACC) by relying more on debt. However, at very high debt-to-asset ratios, businesses may make their capital structure more optimal (reduce their WACC) by relying less on debt. While conditions change, in general, determining the optimal capital structure for a business involves finding the debt-to-assets ratio that minimizes WACC.

For example, if 40% of capital was obtained through long-term debt at an effective cost of 6%, 10% of capital was obtained by issuing preferred stock with an effective cost of 8%, and 50% of capital was obtained by issuing common stock expected to return 11% to shareholders, the weighted average cost of capital is:

$40\% \times 6\% + 10\% \times 8\% + 50\% \times 11\%$

$= 2.4\% + 0.8\% + 5.5\%$

$= 8.7\%$

Lecture 3.21 – Risk Management

Expected Returns

The total return of an investment includes cash distributions (interest, dividends, rents) and the change (growth) in the value of the asset (Total Return = Distribution Rate + Growth Rate). This model, known as the **Gordon Growth Model**, assumes that the reinvested assets will increase distributions by the amount of reinvestment, so that the growth in the assets will be the growth rate of future dividends. Eventually, all earnings are going to be distributed over the life of the company.

For example, an investment of $100 that pays a dividend of $3 and grows in value to $107 at the end of the year has a total return of 10% (3% distribution + 7% growth). With $107 in assets, the company should be able to pay out a dividend of $107 × 3% = $3.21 next year, and add $107 × 7% = $7.49 to the value of the asset, increasing it to $114.49, on which an even higher 3% dividend can then be paid in the third year, and so on.

A group of investments (whether in similar types of assets or not) is known as a **portfolio**. The expected return on a portfolio is a weighted average of the expected return of the individual investments.

For example, if a portfolio is invested 60% in Asset A, which is expected to return 10%, and 40% in Asset B, which is expected to return 5%, the expected return (ER) of the portfolio is:

(60% × 10%) + (40% × 5%)
= 6% + 2%
= 8%

Average Returns

Since investors cannot know the future, estimates of investments' expected returns (ER) are commonly simply the averages of historical (or past) rates of return. Average historical rates of return can be computed arithmetically (simple average) or geometrically (taking into account the effects of compounding):

- The ***arithmetic (simple) average return rate*** simply adds the returns for several periods and divides by the number of periods.
- The ***geometric average return rate*** is the single annual compound rate of return required to turn the initial value of an investor's investment into its final value over the number of periods intervening. Geometric averages are lower than arithmetic averages, except for the case when all single-period rates are identical.

For example, if an investment grew by 44% in one year and 0% in the next, then $100 would have grown to $144 in the first year and remained there in the second.

- Arithmetic average return = 22% (the average of 44% and 0%)
- Geometric average return = 20% (an investment of $100 earning a consistent 20% each year would grow to $120 after one year and $144 after two years).

Standard Deviation

A very common measure of investment risk is the **standard** deviation (SD, or the lower case Greek letter sigma, σ), which is a measure of the volatility of an investment. (The variance, σ^2, is simply the standard deviation squared, or multiplied times itself). To calculate SD, take the following steps:

1. Determine the arithmetic average return.
2. Calculate the difference from the average for each individual period.
3. Square those differences.
4. Determine the average of the squared values.
5. Calculate the square root of this average.

Since most investors are **risk averse**, investors demand higher expected returns from investments with a higher standard deviation (e.g., common stocks) and demand lower expected returns from investments with a lower standard deviation (e.g., bonds).

As an example, assume an investment has returned 7%, 15%, and 8% in 3 different periods.

1. (7% + 15% + 8%) / 3 = 10% arithmetic average return.
2. –3%, +5%, -2% are the differences from the average in the 3 periods.
3. 9%, 25%, 4% are the squares of the differences.
4. (9% + 25% + 4%) / 3 = 12.67% average of the squared values.
5. Square root of 12.67% = 3.56% = the standard deviation (SD)

Notice that the SD of 3.56% is slightly higher than the average of the absolute values of the differences: (3% + 5% + 2%) / 3 = 3.33%. This result follows because the calculation of the SD gives disproportionate weight to bigger differences.

The **Coefficient of Variation** (CV) is another common measure of risk. Standard deviations (SDs) are somewhat related to the averages from which they are computed (e.g., SDs computed among values in the billions are typically going to be much larger than SDs computed among values in the thousands). The CV seeks to address this shortcoming in SDs and provide a measure of Relative Risk that is readily comparable across investments of different sizes (i.e., whether in the billions or thousands). To compute the CV (or relative risk) for an investment, one would divide the standard deviation (SD) of the investment's returns by the investment's average (or expected) return (ER). Depending on their degree of risk averseness, investors will weigh the expected returns (ER) and relative risks (CV) of their investment options, generally preferring some combination of higher ERs and lower CVs.

Portfolio Risk

Investors once largely assumed that portfolios consisting of individually riskier investments would be riskier, and that to reduce risk portfolios had to include safer investments. In 1951, Harry Markowitz revolutionized the investment field launching **Modern Portfolio Theory (MPT)** pointing out that the standard deviation of a portfolio of investments will generally be much smaller than the standard deviation of the individual investments, since the prices of various individual investments do not each move up and down at exactly the same time.

The measure of the degree to which various (i.e., typically more than two) investments move together may be captured by a **covariance matrix.** Since interpreting a covariance matrix is not straightforward, investors often focus on the **correlation coefficients** between pairs of investments (i.e., between only one investment and only one other investment at a time). We

addressed correlation coefficients above, but repeat the key points here adapted for the case of portfolio theory.

- *Correlation coefficient = 1.00* When one investment goes up, the other always goes up. When one goes down, the other always goes down.
- *Correlation coefficient = 0* There is no identifiable relationship between the two investments, whether one goes up or down does not reliably predict whether the other goes up or down.
- *Correlation coefficient = -1.00* When one investment goes up, the other always goes down. When one goes down, the other always goes up.

Whenever the correlation coefficient between two investments is less than 1.00, the standard deviation of the portfolio will be lower than the average of the standard deviations of the individual investments. This result follows because the differences in the investments' price fluctuations somewhat offset each other.

By combining investments that have low covariances with each other, an investor can largely eliminate **unsystematic (unique) risk**, or the risk that pertains to one investment (e.g., a single company: Rio Tinto) or even to a group of similar investments (e.g., to mining stocks). What remains is the unavoidable or **systematic risk** that cannot be diversified away and that results from market-wide factors and economy-wide fluctuations in GDP, inflation, interest rates, etc. According to MPT, investors may expect some reward from bearing systematic risk in the form of the market's average (or expected) returns. In contrast, investors bearing unsystematic risks (i.e., portfolios that are not properly diversified) may expect only lower average (or expected) returns since they are bearing risks that may be avoided.

Investors may use the **mean-variance optimization** technique, combining the expected returns of various investments and their covariances with each other, to identify the specific portfolio that will, for any particular level of ("desired" or acceptable) volatility (or variance or risk), have the highest possible expected return (or, conversely, to identify the portfolio that will, for a particular expected return, have the lowest level of volatility). The portfolio with the highest average (or expected) return for a particular level of volatility is known as the most **efficient portfolio** for that level of variance. An **efficient frontier** plots the combinations of assets that yield the most efficient portfolios for various levels of risk (technically efficient frontiers exist in multi-dimensional space for multi-investment portfolios, but efficient frontiers are commonly shown for simplified two-asset portfolios (e.g., stocks vs. bonds) in graphs with "only" the standard two vertical and horizontal axes).

William Sharpe developed Beta as a standardized measure of investments' systematic risk. **Beta risk** measures how changes in the value of an individual investment compares with changes in the value of an overall or market-wide portfolio (commonly the S&P 500 stock index). Thus, Beta measures (or compares) the volatility of an individual investment relative to that of the portfolio (or the market) as a whole. A beta of 1 indicates that the investment moves up and down at approximately the overall rate for the portfolio (or market), a beta of 0.5 indicates that it moves up and down only half as much, and a beta of 2 indicates that it goes up and down twice as much as the overall portfolio. For instance, when the overall stock market goes up by 10%, a stock with a beta of 0.5 would be expected to go up only by 5%, and a stock with a beta of 2 would be expected to go up 20%. (Similarly, a 10% market drop will result in drops of 5% and 20%, respectively).

The **Capital Asset Pricing Model** (*CAPM*) for which Sharpe shared a Nobel Prize in Economics in 1990 (along with Harry Markowitz) suggests that investments with higher betas have higher

expected returns to compensate for the extra volatility. The degree to which a portfolio does better or worse than the return predicted by its beta is known as **alpha**, and is considered to be a measure of the degree of success or failure of the individual portfolio manager. One implication of the CAPM is that the **asset allocation** of a portfolio (e.g., the percentage of a person's investments devoted to stocks vs. bonds) is overwhelmingly the most important factor in determining the returns an investor can expect.

Many academics conclude that markets generally reflect the combined knowledge of their participants, and that individual variations from an alpha of zero are largely a matter of luck. The conclusion that individuals cannot outperform market averages over long periods of time except by luck is known as the **Efficient Market Hypothesis** (*EMH*). This hypothesis led to the development of **index funds**, which buy all of the available investments in a particular category instead of trying to determine which ones will appreciate in value the most (for example, an S&P 500 stock index fund buys all 500 stocks in the Standard & Poor's market average). If unsystematic risk isn't rewarded reliably (and there are no particularly large costs for buying the smallest, least liquid stocks), buying less than all 500 would theoretically result in extra risk for no extra return. Also, since the strongest form of the EMH assumes that prices reflect the best judgment of the participants, the index fund should not invest equal amounts in each of the index components (e.g., not 0.2% each for the S&P 500), but hold stocks in proportion to the total market values of the different companies (i.e., more in Apple—a stock with a large total valuation—than in Disney—a stock with a smaller total valuation). (In practice, most analyses find that increasing the number of stocks in one's portfolio to 30 or 40 yields almost all the gains from reducing unsystematic risk. Of course, the 30-40 stocks would need to be chosen to be somewhat representative of the overall selection of 500 stocks. Buying 30-40 technology stocks would expose one to the unsystematic risks of the technology sector, and not to the systematic risk of the market as a whole).

More recently, there have been several challenges to both the CAPM and EMH. Beta has not proven to be a very good predictor of returns, and there is even some evidence that higher betas often result in lower expected returns. For example, initial public offerings (IPOs) generally represent relatively new and untested companies that are much more volatile than average, but they have consistently had worse-than-average subsequent performance in the market, combining high volatility and low returns. There is also some evidence that stocks with low prices in relation to earnings and assets (known as **value stocks**) do better than stocks with high relative prices (known as **growth stocks**), even though the latter are more volatile, and that stocks with a smaller total market capitalization do better than those with larger total market values, irrespective of volatility.

The EMH counterargument is that value stocks generally represent companies and industries that aren't growing quickly, and face more **business risk** (risk of outright bankruptcy or other failure), and that small companies are similarly far more likely to fail than large ones. Others believe these differences represent evidence of consistent bias by the participants in the market that may occasionally be exploited to gain higher-than-average returns by those who resist these biases (this view is studied by **Behavioral Finance Theory**).

Investors often use the term *market trend* to refer to the direction in which financial markets are moving. The terms ***bull market*** and ***bear market*** describe upward and downward movements in the market, respectively, and can be used to describe either the market as a whole or specific sectors and securities. A bear market normally refers to a period during which prices have fallen by more than 20% from their previous peak. A bull market normally refers to a period during which prices have risen by more than 20% from their previous trough (during the previous bear market). Multi-year periods of sustained price growth (even if they contain some bear markets) are

commonly referred to as "secular bull markets" (e.g., that from the early 1980s to the late 1990s). Multi-year periods without sustained price growth (even if they contain some bull markets) are commonly referred to as "secular bear markets" (e.g., that from the mid-1960s to the early 1980s, and more recently from the late 1990s to the later 2000s).

Interest Rates and Risks

Through loans (and bonds) borrowers may use funds that they would otherwise not have and lenders forgo the use of those funds. In compensation, borrowers pay lenders interest. To provide funds to riskier projects (or borrowers), lenders (and investors) demand higher rates of return. Common risks that lenders (and investors) may consider include:

- **Credit (or default) risk:** The risk that borrowers will not abide by the terms of their contracts (e.g., fail to make some payments of interest or principal).
    - **Sector risk:** The fraction of a borrower's credit risk associated with being in its industry.
- **Concentration of credit risk:** The credit risk resulting from lending to only a few borrowers or only to borrowers (even if a large number of them) in related industries. Lenders (and investors) may reduce this risk by diversifying their portfolios of loans (and bonds).
- **Market risk:** The risk that worsening economy-wide conditions will depress the value of all pre-existing assets (independently of whether credit risk worsens).
- **Interest rate risk:** The risk that rising interest rates will depress the resale value of pre-existing bonds (or loans).

The Yield Curve

The **yield curve** presents U.S. Treasury interest rates (yields) in the y-axis (vertical) and terms (or maturities, usually 3 months to 30 years) in the x-axis (horizontal). Most non-government bonds and loans are more or less loosely priced in reference to the yield curve, such that changes in the yield curve affect interest rates in almost all markets throughout the U.S. economy.

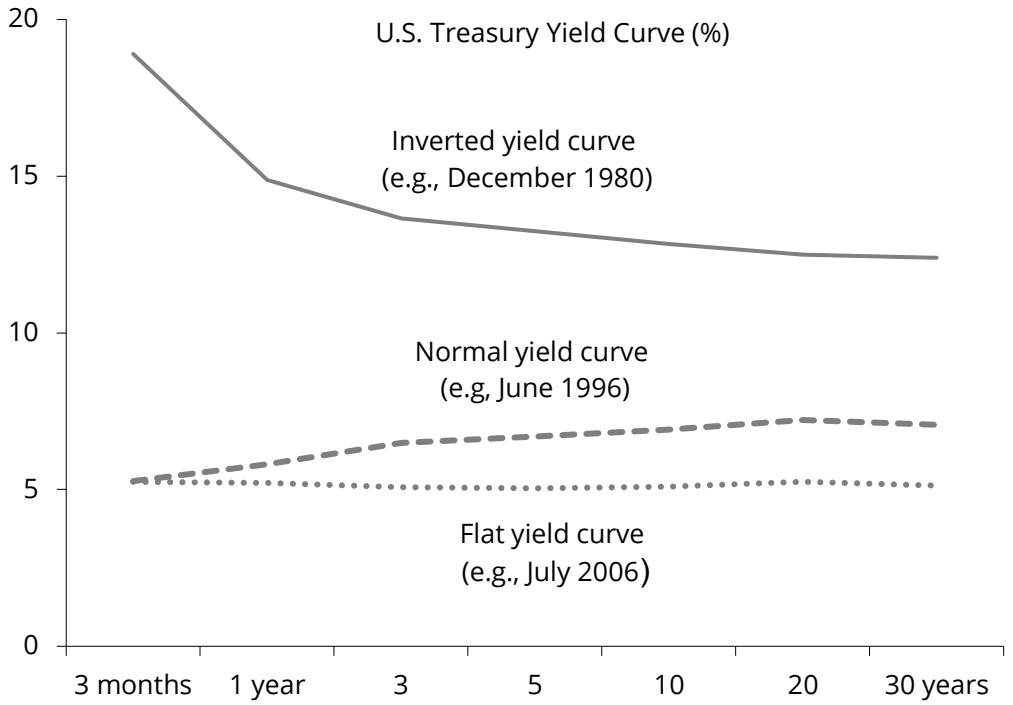
- **Normal yield curve:** Interest rates are higher for longer terms.
  According to the **liquidity preference theory**, interest rates would normally be higher for longer terms than for shorter terms since investors demand more compensation for long-term investments that are more subject to various risks (such as inflation or interest rate risk).
- **Inverted yield curve:** Interest rates are lower for longer terms.
  According to the **expectations theory**, long-term interest rates reflect future expected short-term interest rates. An inverted yield curve usually reflects investors' expectations of upcoming declines in economy-wide interest rates, usually because investors expect falling inflation rates and/or worsening economy-wide conditions (e.g., a recession).
- **Flat yield curve:** Interest rates are similar across terms. Of course, normal yield curves typically flatten before becoming inverted, and inverted yield curves typically flatten before returning to normal.

Moreover, according to the **market segmentation theory**, some participants in bond (and loan) markets may focus on lending at different terms. Thus, different changes in conditions for each set of participants (e.g., different levels of credit losses, capital, or regulatory differences) may result in

interest rates, at least temporarily, changing in different directions for different terms. For instance, depository institutions focus more on short-term bonds and loans, while some institutional investors (e.g., life insurance companies and pension funds) focus more on longer-term bonds and loans.

In practice, yield curves may not always be "straight lines." **Changing expectations** about the future and the **relative liquidity** of bond (and loan) markets at various terms may even cause the yield curve to become temporarily "**humped**," i.e., with higher rates for intermediate terms than for short or long terms.

Note that the term "normal" does not mean to imply either "common" or "preferable." Normal simply means that shorter terms have lower rates. During periods of expansionary monetary policy, shorter terms are typically pushed lower, making the yield curve look "normal." In contrast, during periods when monetary policy is neutral, yield curves often look rather flat.



Predicting macroeconomic conditions and interest rates is inherently difficult. Thus, determining the ideal set of maturities and loan types (e.g., fixed vs. variable rates) for a firm to use is also difficult. For instance, a borrower using mostly long-term, fixed-rate debt would forgo the benefits of falling interest rates, should interest rates fall. A borrower using mostly short-term (and thus effectively variable rate) debt will experience more liquidity risk, may suffer more earnings volatility, and may, thus, be charged higher rates by lenders. Prudent financial policy would, thus, likely call for diversifying a firm's debt maturities and types.

Lecture 3.23 – Derivatives

Derivatives are financial instruments that derive their value from other underlying assets or prices (commodities, indices, stocks, exchange rates, interest rates, etc.).

- Derivatives are commonly settled through transfers of cash or other liquid assets, taking into account how the prices of the underlying asset evolved relative to the terms set in the original derivative contract.
- Derivatives are financial instruments that have the following **three** characteristics: (**NUNS**)
    - No net investment
    - An Underlying and a Notional amount
    - Net Settlement
        - There is an Underlying price to be used to settle the contract and a Notional amount to calculate the settlement. Little or no payment takes place at origination and the derivative can be settled in a net amount.

Common types of derivatives include:

- **Options** allow (but do not require) holders to *buy (call)* or *sell (put*) an underlying asset at a pre-specified price during a pre-specified period of time (American options) or at a specified date (European options).
- **Forwards** are negotiated contracts in which two parties agree to purchase and sell an underlying asset at a pre-specified price at a future date. The parties may tailor the contract for any amount or date.
- **Futures** are standardized versions of forwards for standardized amounts (e.g., X tons of grade Y steel) and dates (e.g., the last day of the quarter).
- **Swaps** are agreements by which two parties agree to swap certain streams of payments. In a **currency swap**, the parties may swap flows in two currencies, potentially removing exchange rate risk for both parties. In **interest rate swaps**, the parties may swap a fixed rate flow of payments and a variable rate flow of payments. **Swaptions** are contracts that give holders the option to enter into new swaps, or extend or terminate existing swaps.

Risks Associated with Derivatives

Derivatives may be used for two different purposes:

- **Speculation:** Businesses may use derivatives to raise revenues by shouldering other parties' risks, hoping that the losses feared by the counterparty do not materialize, e.g., issuer of credit default swaps (CDS) for subprime mortgages charge a premium to protect others against defaults. The issuer will make profits if the defaults do not take place.
- **Hedging:** Businesses may use derivatives to reduce their risks, e.g., an American company with costs in the U.S. but an expected future stream of revenues in Japanese Yen may use currency derivatives to lock in those future revenues as dollars using current exchange rates, thus eliminating its exchange rate risk.

Various business risks are associated with the use of derivatives.

- **Credit (or counterparty) risk:** the counterparty in a contract not honoring its obligations.
- **Market risk:** Adverse changes in economy-wide conditions will affect the fair value of the derivative. This risk is only applicable to derivatives used for speculation.

- **Legal risk:** Legislative or regulatory changes may alter or void the derivative's contracts.
- **Basis risk:** Changes in the value of the derivative may not match exactly changes in the value of the asset (or flows) that is being hedged. In this case, the derivative will fail to hedge risks completely.

Using Derivatives to Hedge

Three common uses of derivatives to hedge are:

- **Fair value hedges:** against changes in the value of an asset or liability that the firm has or expects to have.
- **Cash flow hedges:** against fluctuations in future cash flows.
- **Foreign currency hedges:** against the effects of fluctuations in the value of a foreign currency on the value of assets, liabilities, or cash flows.

According to the Accounting Standard Codification, derivatives must be reported at ***fair value***. However, changes in the value of derivatives that qualify as hedges may be used to offset changes in the value of the hedged items. Unrealized gains and losses are reported as follows:

- **Fair value hedges:** For derivatives qualifying as fair value hedges, if the hedge is completely effective, changes in the value of the derivative and in the value of the item being hedged will offset one another perfectly, and neither change needs to be reported in earnings (the income statement). If the hedge is not completely effective, only the net effect of the changes in the value of the derivative and in the value of the item being hedged will be reported in earnings.
- **Cash flow hedges:** In contrast, for derivatives qualifying as cash flow hedges, the effective part of changes in the value of derivatives (i.e., the part offset by changes in the value of hedged items) is reported as "other comprehensive income" in the balance sheet section on stockholders' equity. The ineffective part of changes in the value of derivatives (i.e., that without an offset in changes in the value of hedged items) is reported in earnings (the income statement).

Valuing Derivatives

Derivatives that trade on public markets are reported at their quoted prices. For derivatives that do not trade on public markets, fair values are commonly estimated using various valuation models such as:

- **Black-Scholes:** used to estimate the value of stock options.
- **Monte Carlo simulations**
- **Binomial trees**
- **Zero-coupon method:** used to estimate the value of interest rate swaps.

The calculations used in these models are generally complex and require specialized knowledge or computer programs.

Next, we work through an example of using derivatives.

Assume your client is an oil distributor. On October 1, it purchased 1 million gallons of gasoline from its supplier (a refinery) paying $3.30 per gallon (a wholesale price). The client plans to sell oil to various airlines in early January, but is concerned that, in the meantime, the price of oil might drop considerably from the current selling price of $3.50 (a retail price). To protect from losses in the value of its inventory, the client sells a gasoline futures contract based on a wholesale gasoline price index per gallon (the underlying) times 1 million gallons (the notional amount), with a settlement date of January 2. Assume the price of the index drops $0.20 (or 20 cents) per gallon by the end of the year.

The purchase of the inventory by the distributor from the refinery is recorded as follows (assume immediate payment and entries in millions of dollars):

10/1	Inventory	3.30	
	Cash		3.30

When the futures contract is established, there is no entry, since no cash is involved. This is a **fair value hedge**, since the distributor is hedging against an existing asset.

As of the end of the year, the decline of $0.20 per gallon in the price of oil results in a loss on the inventory of $200,000. The futures contract, however, is now expected to result in a collection of $200,000 upon settlement. The entries are:

12/31	Loss on market decline in inventory	0.2	
	Inventory		0.2
	Receivable on derivative	0.2	
	Gain on fair value hedge		0.2

Both the loss on inventory and gain on the fair value hedge are included in the computation of net income, so there is no net income effect. This, of course, was the goal of the hedge.

Let's now go back to October 1 and consider the issues from the point of view of the airline that is planning on purchasing the gasoline in early January. The airline might enter into a mirror image of the very same contract to hedge against a price increase. However, for the airline, it would be a **cash flow hedge**, since, as yet, there is no asset (like the inventory), liability, or fixed commitment for the purchase.

On October 1, the airline enters into a derivative based on the gasoline index with the same notional amount of $1 million gallons. There is **no entry** on that date.

On December 31, the price decline of $0.20 per gallon in the index means that the airline expects to have to pay $200,000 on the settlement date. The entry is:

12/31	Other comprehensive income – loss on cash flow hedge	0.2	
	Payable on derivative		0.2

Note that the loss is **not** included in the calculation of net income. The reason why, is that the decline in gasoline is expected to reduce the cost of inventory in the next period; so, this loss will be offset by a reduction in the cost of sales in the next period. Since the offsetting event is not yet reflected in net income, neither can the hedge.

To summarize, when derivatives are used as speculation or fair value hedges, gains and losses are reported in net income (in the case of a fair value hedge, there will be offsetting amounts on the asset or commitment being hedged). When derivatives are used as cash flow hedges, gains and losses are reported in other comprehensive income (they are transferred to net income when the expected events occur, and offsetting amounts are reported in net income).

Derivatives Summary

Speculation (non-hedge)

- Acquired to take on risk, hoping for profit.
- Gain or loss in income from continuing operations **(I/S).**

Fair value hedge

- Acquired to hedge against a recognized asset or liability or a firm purchase commitment.
- Gain or loss in income from continuing operations **(I/S).**
- Should be offset by loss or gain on hedged item.

Cash flow hedge

- Acquired to hedge against a forecasted future transaction.
- Gain or loss in other comprehensive income (OCI) **(B/S).**
- Nothing included in net income until forecasted activity occurs.

Foreign currency hedge against an investment in foreign operations

- Acquired to hedge against currency risk from a major investment in a company with a local currency (currency in which books are maintained) other than the U.S. dollar.
- Gain or loss in other comprehensive income (OCI) **(B/S).**
- Offsets translation losses or gains from investment in foreign operations.

Lecture 3.25 – Financial Management – Class Questions – DRS

Major Manufacturing will receive a windfall. Of this money, $3,500,000 is not earmarked for taxes, dividends, or an investment. Shareholders are not eager for an increase either in dividends or debt. Money not used for investment will be distributed to shareholders. Generally, the hurdle rate is 10%. As an S corporation, Major does not pay any income taxes.

Miles Stand, the CEO, asked the accounting staff to provide a table of the potential investments in Major's operations to Alice Abernathy so that she could compare the investments, rank each of them that exceeds the hurdle rate, and make a recommendation as to which investments or combination of investments, if any, are appropriate. Unfortunately, the accounting staff neglected to finish the chart for project D and Alice is unsure of how to complete it, so she needs you to look over the documents and help straighten out her memo.

Major has four manufacturing departments. Work in each department is finished at the fiscal year-end for extensive cleaning and repairs, so there is no work-in-process inventory at the fiscal year-end. Materials move through only one manufacturing department.

Amend the summary memo that Alice has drafted, as appropriate. Round the net present value to the nearest $1,000. Round the payback period to the closest year.

To revise the document, click on each segment of underlined text below and select the needed correction, if any, from the list provided. If the underlined text is already correct in the context of the document, select "original text." If the underlined text is extraneous, select "delete text."

To: Miles Stand, CEO
From: Alice Abernathy
Re: Analysis of Investment Opportunities
Date: January 7, 20X0

There are five potential projects (A, B, C, D and E) being considered. The accounting staff and I have prepared the following table for your comparison. I have compared the investments, ranked them, and provided a recommendation for each. Please let me if I can be of any further assistance.

		Investment (all first year)	Net present value at 10%	Internal rate of return	Payback period (in years)
A.	Machine shop	$1,600,000	$744,000	20%	4
B.	Replace press	1,000,000	988,000	30%	3
C.	Replace forklifts	800,000	179,000	15%	5
D.	Upgrade safety equipment	200,000	–-	25%	–-
E.	Solar electricity system	1,000,000	(601,000)	5%	15
	Total	$4,600,000			

Adjustments:

1. The net present value of the safety equipment upgrade is $200,000.
2. The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.

Recommendations:

3. We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
4. We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
5. We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
6. We should undertake the safety equipment upgrade project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
7. We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

Ranking of Projects:

8. The project with the highest rank is project A, the machine shop project.
9. The project with the second-highest rank is project A, the machine shop project.
10. The project with the third-highest rank is project A, the machine shop project.
11. The project with the fourth-highest rank is project A, the machine shop project.
12. The project with the lowest rank is project A, the machine shop project.

Items for Analysis

The net present value of the safety equipment upgrade is $200,000.

1. Choose an option below:

- [Original text] The net present value of the safety equipment upgrade is $200,000.
- [Delete text]
- The net present value of the safety equipment upgrade is $0.
- The net present value of the safety equipment upgrade is $50,000.
- The net present value of the safety equipment upgrade is $100,000.
- The net present value of the safety equipment upgrade is $150,000.

The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.

2. Choose an option below:

- [Original text] The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.
- [Delete text]
- The payback period of the safety equipment upgrade is 1 year.
- The payback period of the safety equipment upgrade is 2 years.
- The payback period of the safety equipment upgrade is 4 years.

- The payback period of the safety equipment upgrade is 8 years.
- The payback period of the safety equipment upgrade is 10 years.

We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

3. Choose an option below:

- [Original text] We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should not undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

4. Choose an option below:

- [Original text] We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

5. Choose an option below:

- [Original text] We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

- [Delete text]
- We should undertake the forklifts replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the forklifts replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

6. Choose an option below:

- [Original text] We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the safety equipment project. This project does not meet our internal rate of return criteria.
- We should undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the safety equipment project. This project does not meet our internal rate of return criteria.
- We should not undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

7. Choose an option below:

- [Original text] We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

- We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should not undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

The project with the highest rank is project A, the machine shop project.

8. Choose an option below:

- [Original text] The project with the highest rank is project A, the machine shop project.
- [Delete text]
- The project with the highest rank is project B, the press replacement project.
- The project with the highest rank is project C, the forklifts replacement project.
- The project with the highest rank is project D, the safety upgrade project.
- The project with the highest rank is project E, the solar electricity system project.

The project with the second-highest rank is project A, the machine shop project.

9. Choose an option below:

- [Original text] The project with the second-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the second-highest rank is project B, the press replacement project.
- The project with the second-highest rank is project C, the forklifts replacement project.
- The project with the second-highest rank is project D, the safety upgrade project.
- The project with the second-highest rank is project E, the solar electricity system project.

The project with the third-highest rank is project A, the machine shop project.

10. Choose an option below:

- [Original text] The project with the third-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the third-highest rank is project B, the press replacement project.
- The project with the third-highest rank is project C, the forklifts replacement project.
- The project with the third-highest rank is project D, the safety upgrade project.
- The project with the third-highest rank is project E, the solar electricity system project.

The project with the fourth-highest rank is project A, the machine shop project.

11. Choose an option below:

- [Original text] The project with the fourth-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the fourth-highest rank is project B, the press replacement project.
- The project with the fourth-highest rank is project C, the forklifts replacement project.
- The project with the fourth-highest rank is project D, the safety upgrade project.
- The project with the fourth-highest rank is project E, the solar electricity system project.

The project with the lowest rank is project A, the machine shop project.

12. Choose an option below:

- [Original text] The project with the lowest rank is project A, the machine shop project.
- [Delete text]
- The project with the lowest rank is project B, the press replacement project.
- The project with the lowest rank is project C, the forklifts replacement project.
- The project with the lowest rank is project D, the safety upgrade project.
- The project with the lowest rank is project E, the solar electricity system project.

Exhibits

Excerpt from attorney's letter

Excerpt from Attorney's Letter

A new regulation (AW13908.78) goes into effect as of January 1, 20X1. Without additional safety measures, the acid wash department will have to discontinue operations. Please contact me for additional details.

Proposal from Sizzle Acid Protection, Inc.

Sizzle Acid Protection, Inc.

1200 Industrial Road
Fort Myers, FL
1-800-555-BURN

Acid remediation shower	$150,000
Acid neutralization system	47,000
Safety goggles (case of 144)	1,000
Employee safety signage	1,000
Initial training for employees	1,000
Total	$200,000

- Installation from December 10, 20X0, to December 25, 20X0, with 10 days of unlimited access from 7:00 a.m. to 6 p.m.
- Training finished by December 31, 20X1, on any non-holiday weekday of your choice.
- Guaranteed compliant with regulation AW13908.78 for 10 years, given no changes to the regulation.
- Offer valid until November 30.

Acid wash department selected information

Major Manufacturing - Acid Wash Department
Select Amounts ($ in 1,000s)
January 3, 20X0

Plant and Equipment	
Historical Cost	$2,000
Deprecation	1,500
Salvage Value	50

Anticipated amounts	**20X1 (Year 1)**	**20X2–20X10 (Years 2-10)**
Capacity	96%	98%
Sales dollars	683	709
Cost of goods sold	638	650
Sales less cost of goods sold	45	59

Accounting Department Worksheet Excerpts

Major Manufacturing Company
Comparison of Potential Investments
January 21, 20X0

Project	A	B	C	D	E
Investment	1,600,000	1,000,000	800,000	200,000	1,000,000
Estimated annual cash inflow (ACI)	381,500	323,500	159,400		65,000
Investment divided by ACI	4.2	3.1	5.0		15.4
Payback period (rounded)	4	3	5		15
IRR—see below (rounded)	20%	30%	15%		5%
Interest rate	10%	15%	20%	25%	30%
Present value of an annuity factor	6.1446	5.0188	4.1925	3.5705	3.0915
Present value of project A ACI	2,344,165	1,914,672	1,599,439	1,362,146	1,179,407
Net present value, project A	744,165	314,672	-561	-237,854	-420,593
Present value of project B ACI	1,987,778	1,623,582	1,356,274	1,155,057	1,000,100
Net present value, project B	987,778	623,582	356,274	155,057	100
Present value of project C ACI	979,449	799,997	668,285	569,138	492,785
Net present value, project C	179,449	-3	-131,716	-230,862	-307,215

Present Value Tables

Present Value of a $1 Single Sum (PVS)

Period	5%	10%	15%	20%	25%	30%
1	0.9524	0.9091	0.8696	0.8333	0.8000	0.7692
2	0.9070	0.8264	0.7561	0.6944	0.6400	0.5917
3	0.8638	0.7513	0.6575	0.5787	0.5120	0.4552
4	0.8227	0.6830	0.5718	0.4823	0.4096	0.3501
5	0.7835	0.6209	0.4972	0.4019	0.3277	0.2693
6	0.7462	0.5645	0.4323	0.3349	0.2621	0.2072
7	0.7107	0.5132	0.3759	0.2791	0.2097	0.1594
8	0.6768	0.4665	0.3269	0.2326	0.1678	0.1226
9	0.6446	0.4241	0.2843	0.1938	0.1342	0.0943
10	0.6139	0.3855	0.2472	0.1615	0.1074	0.0725
30	0.2314	0.0573	0.0151	0.0042	0.0012	0.0004
83	0.0174	0.0004	0.0000	0.0000	0.0000	0.0000

Present Value of a $1 Annuity (PVA)

Period	5%	10%	15%	20%	25%	30%
1	0.9524	0.9091	0.8696	0.8333	0.8000	0.7692
2	1.8594	1.7355	1.6257	1.5278	1.4400	1.3609
3	2.7232	2.4869	2.2832	2.1065	1.9520	1.8161
4	3.5460	3.1699	2.8550	2.5887	2.3616	2.1662
5	4.3295	3.7908	3.3522	2.9906	2.6893	2.4356
6	5.0757	4.3553	3.7845	3.3255	2.9514	2.6427
7	5.7864	4.8684	4.1604	3.6046	3.1611	2.8021
8	6.4632	5.3349	4.4873	3.8372	3.3289	2.9247
9	7.1078	5.7590	4.7716	4.0310	3.4631	3.0190
10	7.7217	6.1446	5.0188	4.1925	3.5705	3.0915
30	15.3725	9.4269	6.5660	4.9789	3.9950	3.3321
83	19.6514	9.9963	6.6666	5.0000	4.0000	3.3333

Document Review Simulation Solution

To: Miles Stand, CEO
From: Alice Abernathy
Re: Analysis of Investment Opportunities
Date: January 7, 20X0

There are five potential projects (A, B, C, D and E) being considered. The accounting staff and I have prepared the following table for your comparison. I have compared the investments, ranked them, and provided a recommendation for each. Please let me if I can be of any further assistance.

		Investment (all first year)	Net present value at 10%	Internal rate of return	Payback period (in years)
A.	Machine shop	$1,600,000	$744,000	20%	4
B.	Replace press	1,000,000	988,000	30%	3
C.	Replace forklifts	800,000	179,000	15%	5
D.	Upgrade safety equipment	200,000	150,000	25%	4
E.	Solar electricity system	1,000,000	(601,000)	5%	15
	Total	$4,600,000			

Adjustments:

1. The net present value of the safety equipment upgrade is $150,000.
2. The payback period of the safety equipment upgrade is 4 years.

Recommendations:

3. We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
4. We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
5. We should not undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
6. We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
7. We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.

Ranking of Projects:

8. The project with the highest rank is project B, the press replacement project.
9. The project with the second-highest rank is project D, the safety upgrade project.
10. The project with the third-highest rank is project A, the machine shop project.
11. The project with the fourth-highest rank is project C, the forklifts replacement project.
12. [Delete text]

Explanations

1. <u>The net present value of the safety equipment upgrade is $150,000.</u>

Without the acid wash department upgrade, the entire department must cease operations; therefore, the sales and cost of goods sold of the acid wash department are included in determining the cash inflows of the project. The book value of the acid wash department is irrelevant. Deleting the text is inappropriate as the omission in the table should be corrected.

The NPV of the project at 10% (the hurdle rate) is $150,000, and there is no concern about meeting the hurdle rate. Calculations follow.

NPV of not upgrading: $50,000 (the salvage value)
NPV of upgrading $149,804. This amount rounds to $150,000.

The present value of the cash flows from the acid wash department for the next ten years offsets the upgrade cost. (As the information on costs shared by the manufacturing departments is not given, shared costs are not included in this determination, but they would make the cost of not upgrading greater, as these costs then would be borne by the other departments to a greater extent.)

An annuity is defined as a series of equal payments. The cash inflows for the safety upgrade are not equal for all ten years. The cash inflows are equal for the second through the tenth years. To determine the present value of the cash inflows, they should be separated into two payment streams: (1) the present value of one payment of $45,000 at the end of one year [abbreviated as PVS ($45,000, 1 year)] and (2) the present value of nine equal payments of $59,000 for the second through tenth years [abbreviated as PVA ($59,000, years 2 through 10)]. To calculate the present value of nine equal payments of $59,000 for the second through tenth years, one may subtract the present value of a single sum of $59,000 for one year from the present value of an annuity of 59,000 for ten years. (There are other ways to separate the payment stream and arrive at the same amount for the present value of the cash inflows.)

NPV (safety upgrade, 10%) = PVS ($45,000, 1 year, 10%) + PVA ($59,000, years 2 through 10, 10%) – investment = $40,910 + $308,894 - $200,000 = $149,804

PVS ($45,000, 1 year, 10%) = ($45,000 × 0.9091) = $40,910
PVS ($1, 1 year, 10%) = 0.9091 (from PVS table, 1 year row, 10% column)

PVA ($59,000, years 2 through 10, 10%) = PVA ($59,000, 10 years, 10%) – PVS ($59,000, 1 year, 10%)
PVA ($1, 10 years, 10%) = 6.1446 (from PVA table, 10-year row, 10% column)
= ($59,000 × 6.1446) – ($59,000 × 0.9091)
= $362,531 – $53,637 = $308,894

2. <u>The payback period of the safety equipment upgrade is 4 years.</u>

Without the acid wash department upgrade, the entire department must cease operations; therefore, the sales and cost of goods sold of the acid wash department are included in determining viability of the project. The book value of the acid wash department is irrelevant. Deleting the text is inappropriate as the omission in the table should be corrected.

The payback period is about 3.6 years. This amount rounds to 4 years. Calculations follow:

$200,000 cost – $45,000 year 1 cash flow = $155,000 amount remaining after 1st year.
$155,000 remaining investment / $59,000 cash flow for subsequent years = 2.6 years.
2.6 years +1st year = 3.6 years.

3. **(Project A) We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.**

   Given the high internal rate of return (IRR) and the sufficient funds, project A should be undertaken. The hurdle rate is 10%; this project has an internal rate of return (IRR) of 20%. The company can fund both projects B (at $1,000,000) and D (at $200,000)—both have higher IRRs—and still have sufficient funds available to invest in project A, which will require a $1,600,000 investment: $3,500,000 available – $1,000,000 project B – $200,000 project D = $2,300,000 funds available for project A.

4. **(Project B) We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.**

   Given the high internal rate of return and the sufficient funds, project B should be undertaken. The hurdle rate is 10%; this project has an internal rate of return (IRR) of 30%. As this project has the highest internal rate of return, Major would give this project top priority for funding (barring strategic considerations—which rarely appear on the exam and are not mentioned in this simulation).

5. **(Project C) We should not undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.**

   Major cannot fund all projects since it has only $3,500,000 and funding all projects would cost $4,600,000; Major does not want to issue new debt or equity. Although this project's internal rate of return (IRR) of 15% exceeds the hurdle rate of 10%, the funding of projects with higher IRRs (projects A at $1,600,000, B at $1,000,000, and D at $200,000) leaves insufficient funds available to invest in this project: $3,500,000 available – $1,600,000 project A – $1,000,000 project B – $200,000 project D = $700,000 < $800,000 needed for forklifts replacement.

6. **(Project D) We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.**

   Given the high internal rate of return and the sufficient funds, project D should be undertaken. The hurdle rate is 10%; this project has an internal rate of return (IRR) of 25%. The company can fund project B at $1,000,000 (the only project with a higher IRR) and still have sufficient funds available to invest in project D, which will require a $200,000 investment: $3,500,000 available – $1,000,000 project B = $2,500,000 funds available for project D.

7. **(Project E) We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.**

   The hurdle rate is 10%; this project has an internal rate of return (IRR) of 5%. As this project's internal rate of return (IRR) of 5% is beneath the hurdle rate of 10%, the issue of whether sufficient funds exist is irrelevant.

8. The project with the highest rank is project B, the press replacement project.

Project B, the press replacement project, has an IRR of 30%—so it outranks all other projects under consideration. Project B's rank is higher than project D with an IRR of 25%, project A with an IRR of 20%, project C with an IRR of 15% and project E with an IRR of 5%. In this situation, the IRR model is appropriate to rank the projects. As the instructions were to rank each project that exceeds the hurdle rate, it is inappropriate to delete this text. While the profitability index is theoretically preferable to rank projects of differing sizes, in this scenario, the same ranking results from use of the profitability index and the IRR.

9. The project with the second-highest rank is project D, the safety upgrade project.

Project D, the safety upgrade project, has an IRR of 25%, so it ranks beneath project B with an IRR of 30%, but higher than project A with an IRR of 20%, project C with an IRR of 15%, and project E with an IRR of 5%. In this situation, the IRR model is appropriate to rank the projects. As the instructions were to rank each project that exceeds the hurdle rate, it is inappropriate to delete this text.

10. The project with the third-highest rank is project A, the machine shop project.

Project A, the machine shop project, has an IRR of 20%, so it ranks beneath projects with higher internal rates of return (IRR): project B with an IRR of 30% and project D with an IRR of 25%. This project has an IRR of 20%, so it ranks higher than project C with an IRR of 15% and project E with an IRR of 5%. In this situation, the IRR model is appropriate to rank the projects. As the instructions were to rank each project that exceeds the hurdle rate, it is inappropriate to delete this text.

11. The project with the fourth-highest rank is project C, the forklifts replacement project.

Project C, the forklifts replacement project, has an IRR of 15%, so it ranks beneath projects with higher internal rates of return (IRR): project B with an IRR of 30%, project D with an IRR of 25% and project A with an IRR of 20%. In this situation, the IRR model is appropriate to rank the projects. As the instructions were to rank each project that exceeds the hurdle rate, it is inappropriate to delete this text.

12. [Delete text]

As the instructions were to rank each project that exceeds the 10% hurdle rate, it is appropriate to delete this text—the rank is irrelevant for a project that does not meet minimum profitability criteria (5% IRR).

Lecture 3.26 – Financial Management – Class Questions – TBS

Written Communication 1

Several middle managers at SOMC Corp. have submitted detailed financial proposals outlining possible projects that top managers could choose to fund. Making these decisions, the top managers want to consider the total profitability of each project and the fact that SOMC's capital structure has changed in recent years. Write a memorandum to Olive McEvoy, the chief financial officer, explaining how the internal rate of return technique could be combined with SOMC's weighted-average cost of capital to help make their choices.

REMINDER: Your response will be graded for both technical content and writing skills. Technical content will be evaluated for information that is helpful to the intended reader and clearly relevant to the issue. Writing skills will be evaluated for development, organization, and the appropriate expression of ideas in professional correspondence. Use a standard business memo or letter format with a clear beginning, middle, and end. Do not convey information in the form of a table, bullet point list, or other abbreviated presentation.

To: Mrs. Olive McEvoy, CFO
SOMC Corp.
From: CPA Candidate

Written Communication Solution 1

To: Mrs. Olive McEvoy, CFO
SOMC Corp.
From: CPA Candidate

Thank you for your question regarding how the internal rate of return technique could be combined with SOMC's Weighted-average cost of capital to help make important business choices.

Top managers could choose among several possible projects and take into account SOMC's changing capital structure by computing each project's internal rate of return (IRR) and comparing those IRRs with the company's weighted-average cost of capital (WACC).

Companies may use several methods to help them choose among possible projects. However, some of those methods, like the payback period and the accounting rate of return, do not take into account total profitability. In contrast, the IRR method takes into account projects' total profitability by discounting all projected cash flows using a "hurdle" interest rate.

Companies may obtain funds from a variety of sources, including loans, bonds, preferred stock, and common stock. Since each source may have different costs, companies compute their WACCs to assess their overall (or weighted) cost of capital.

In turn, companies use their WACC to choose what projects to fund. Companies would not fund projects whose IRRs fall short of WACC since that would reduce common stockholders' wealth.

To choose which projects to fund, SOMC's top managers could apply techniques similar to those used by other companies, such as projecting cash flows, capital structures, and costs of funds; computing IRRs and WACCs, and choosing projects whose projected returns exceed the company's costs of capital. If you need any additional information or have questions, don't hesitate to contact me.

Sincerely,

CPA Candidate

Written Communication 2

Grace Fulbright, a research analyst at Dragon Hedge Fund, is concerned that expected changes in interest rates may affect the performance of a portfolio that she is tracking. She has requested that you draft a memorandum explaining the yield curve, the theories that explain its shape, and how its shape may contain relevant information about the future.

REMINDER: Your response will be graded for both technical content and writing skills. Technical content will be evaluated for information that is helpful to the intended reader and clearly relevant to the issue. Writing skills will be evaluated for development, organization, and the appropriate expression of ideas in professional correspondence. Use a standard business memo or letter format with a clear beginning, middle, and end. Do not convey information in the form of a table, bullet point list, or other abbreviated presentation.

To: Miss Grace Fulbright, Research Analyst
Dragon Hedge Fund
From: CPA Candidate

Written Communication Solution 2

To: Grace Fulbright, Research Analyst
Dragon Hedge Fund
From: CPA Candidate

In our earlier conversation, you asked that I explain the yield curve, the theories that explain its shape, and how it may contain relevant information about the future.

The yield curve presents U.S. Treasury interest rates across various maturities. According to the liquidity preference theory, the yield curve should normally be upward sloping (longer-term interest rates being higher than shorter-term interest rates) since investors demand more compensation for long-term investments. According to the expectations theory, long-term interest rates reflect future expected short-term interest rates. According to the market segmentation theory, various participants in bond markets may focus on lending at different terms. Considering all theories jointly, an inverted yield curve (longer-term interest rates being lower than shorter-term interest rates) usually reflects investors' expectations of upcoming declines in economy-wide interest rates, usually because investors expect falling inflation rates or a recession.

The yield curve provides valuable information both about current interest rates and about investors' expectations of future economic conditions. If you have any further questions, please feel free to contact me.

Sincerely,

CPA Candidate

Written Communication 3

JAGD Corp. has long used as sources of capital all of the following: bank loans, new issues of bonds, and periodic issues of common stock. Joseph Heron, the Chief Financial Officer, has grown concerned about the company's growing debt levels and the fixed interest payments they entail. However, other managers are also concerned about diluting ownership in the company should a recently-developed product line prove particularly profitable. Write a memorandum explaining how issuing preferred stock may address all of those concerns.

REMINDER: Your response will be graded for both technical content and writing skills. Technical content will be evaluated for information that is helpful to the intended reader and clearly relevant to the issue. Writing skills will be evaluated for development, organization, and the appropriate expression of ideas in professional correspondence. Use a standard business memo or letter format with a clear beginning, middle, and end. Do not convey information in the form of a table, bullet point list, or other abbreviated presentation.

To: Mr. Joseph Heron, Chief Financial Officer
JAGD Corp.
From: CPA Candidate

Written Communication Solution 3

To: Mr. Joseph Heron, Chief Financial Officer
JAGD Corp.
From: CPA Candidate

Thank you for your question regarding sources of capital and how issuing preferred stock may work out well for your company. Issuing preferred stock would provide JAGD Corp with a source of funds that avoids both (1) the fixed payments and (2) diluting common stockholders' claims.

Companies may obtain funds from a variety of sources. Issuing new debt has the advantage that, should profits increase, existing common stockholders would reap those profits. However, debt has the disadvantage that if the project does not turn out to be successful, the company will still owe payments. Higher levels of debt increase risk. Issuing new common stock has the advantage that the company will not be legally committed to increased payments. If the company experiences higher profits, it will likely increase dividends, but not be legally required to do so. Disadvantages of issuing common stock include (1) that dividends are not tax deductible and (2) that new issues dilute profits.

Preferred stock combines advantages of debt and common stock. Should the company experience difficulties, it could postpone dividends to preferred stockholders. Should the company experience profits, payments to preferred stockholders will be capped.

To reduce its reliance on debt while not diluting profits, JAGD could issue preferred stock. Please feel free to contact me if you have any additional questions or concerns.

Sincerely,

CPA Candidate

Lecture 4.12 – Special Decisions – Class Questions – TBS

Fauna and Flora Industries, Inc., (F&F) is a food producer. It has several divisions encompassing many aspects of food and beverage production from developing new varieties of plants and domestic animals to large dairies, bakeries, and packing facilities.

F&F has just launched a new product, Frosted, so it is looking at the costs and cash flows associated with this project closely.

F&F is starting the process of pricing a new product, Freezed. As a starting point, F&F is looking at cost-plus pricing. F&F uses a standard minimum markup of 20% of gross margin for new products.

The dairy division needs 20,000 barrels of cheese culture #109 annually to use in its production cycle. If F&F buys the culture rather than producing it, the dairy division will eliminate $2 of fixed overhead cost per unit. The remaining fixed overhead will continue even if the culture is purchased from independent suppliers. The cost to buy a barrel of cheese culture #109 from an independent party is $44.

The aquatic division uses a joint process to produce product A, B, and C. Each product may be sold at its split-off point or processed further. Additional processing costs are all variable. Joint product costs are $200,000 and are allocated using the relative-sales-value at split-off method.

Management is considering eliminating the fresh product line from its produce division and keeping only the dried and frozen product lines.

Answer each question. Any information contained in an item is unique to that item and is not to be incorporated in your calculations when answering other items.

	Question	Amount
1.	What amount should be budgeted for cash payments to material suppliers during the period for the Frosted product?	
2.	Using variable costing, what is the budgeted income for the period for the Frosted product?	
3.	Using absorption costing, what is the budgeted income for the period for the Frosted product?	
4.	Actual results are as budgeted, except that only 60,000 of the 70,000 units produced were sold. Using absorption costing, what is the difference between the reported income and the budgeted net income for the Frosted product?	
5.	If a special order for 4,000 units of the Frosted product would cause the loss of 1,000 regular sales, what minimum amount of revenue must be generated from the special order so that net income is not reduced? (All cost relationships are unchanged.)	
6.	What is the minimum price that F&F is willing to assign to its new product, Freezed, rounded to the nearest penny?	

For item 7, determine and select from the choices below.

A. Make
B. Buy
C. Either make or buy

For items 8 through 10, determine and select from the choices below.

A. Sell
B. Process further
C. Either sell or process further

For item 11, determine and select from the choices below.

A. Eliminate
B. Keep

	Question	Answer
7.	Should F&F make or buy cheese culture #109?	
8.	Should F&F sell product A or process it further?	
9.	Should F&F sell product B or process it further?	
10.	Should F&F sell product C or process it further?	
11.	Should F&F eliminate or keep the fresh product line in the produce division?	

Exhibits:

Excerpt from the budget for the Frosted product for a 10-week period:

Sales price	$11 per unit	
Materials	$ 3 per unit	
Manufacturing conversion costs—Fixed		$210,000
Variable	$2 per unit	
Selling and administrative costs—Fixed		$45,000
Variable	$1 per unit	
Beginning accounts payable for materials		$40,000

- Manufacturing and sales of 70,000 units are expected to occur evenly over the period.
- Materials are paid for in the week following use.
- There are no beginning inventories.

Excerpt from the cost sheet for Freezed:

Cost Sheet Freezed	
Direct material	$0.81
Direct labor	1.49
Variable overhead	0.51
Fixed overhead applied	0.86
Manufacturing cost, one barrel	$3.67

Excerpt from the cost sheet for cheese culture #109:

Cost Sheet
Cheese Culture #109

Direct material	$16.00
Direct labor	8.00
Variable overhead	16.00
Fixed overhead applied	8.00
Manufacturing cost, one barrel	$48.00

Excerpts from the detail sheet for the aquatic division's products A, B, and C:

Product	Sales value at split-off	Additional processing costs	Final sales value
A	$ 75,000	$ 30,000	$ 150,000
B	150,000	30,000	180,000
C	30,000	45,000	60,000
Total	$255,000	$105,000	$390,000

Summary from the annual internal financial statements for the produce division

Product line	Dried	Fresh	Frozen	Total
Revenue (in 1,000s)	3,000	6,000	9,000	18,000
Variable costs	1,500	4,500	3,000	9,000
Contribution margin	1,500	1,500	6,000	9,000
Avoidable fixed cost	600	300	3,000	3,900
Unavoidable fixed costs	300	1,500	600	2,400
Fixed costs	900	1,800	3,600	6,300
Net income (in 1,000s)	600	(300)	2,400	2,700

Task-Based Simulation Solution

1. $229,000 A manufacturing budget of 70,000 units for the 10-week period produced evenly indicates that the company will manufacture 7,000 units per week. Each unit requires materials of $3, indicating a weekly material cost of 7,000 units x $3/unit, or $21,000. Since materials are paid for in the week following use, the company will need to pay for the materials already used (i.e., $40,000 beginning accounts payable for materials) and for the materials used during the first 9 weeks of the 10-week period (9 x $21,000 = $189,000). Therefore, the total amount that should be budgeted for cash payments to material suppliers during the period is $229,000 ($40,000 + $189,000).

2. $95,000 Under variable costing, only variable manufacturing costs are assigned to the product, and total fixed overhead is charged against revenues for the period. Thus, under variable costing, budgeted income for the period would be calculated as follows: Sales are 70,000 units x $11/unit = $770,000. Variable costs consist of

materials of $3 per unit, conversion costs of $2 per unit, and selling and administrative costs of $1 per unit, for a total of $6 per unit x 70,000 units = $420,000. Fixed costs consist of fixed conversion costs of $210,000 and fixed selling and administrative costs of $45,000, for a total of $255,000. $770,000 sales – $420,000 variable costs – $255,000 fixed costs = $95,000 budgeted income.

3. $95,000 Under absorption costing, all manufacturing costs are assigned to the product, including fixed overhead. Thus, under absorption costing, the budgeted income for the period would be calculated as follows: Sales are 70,000 units x $11/unit = $770,000. Manufacturing costs consist of materials of $3 per unit, fixed conversion costs of $210,000/70,000, or $3 per unit, and variable conversion costs of $2 per unit, for a total of $8 per unit x 70,000 units = $560,000. Selling and administrative costs consist of variable costs of $1 per unit, or $70,000, and fixed costs of $45,000, for a total of $115,000. $770,000 sales - $560,000 manufacturing costs - $115,000 selling and administrative costs = $95,000 budgeted income. Note: Remember that the differences between variable and absorption costing are timing differences, which result from when the fixed manufacturing overhead is recognized as an expense: under variable costing, it is recognized in the period incurred; under absorption costing, it is recognized in the period in which the units to which fixed overhead has been applied are sold. Thus, under absorption costing, budgeted income for the period would be the same here as under variable costing because there is no difference in inventory since the company will both manufacture and sell 70,000 units during the period.

4. $20,000 Under absorption costing, all manufacturing costs are assigned to the product, including fixed overhead. Thus, under absorption costing, the reported income for the sale of 60,000 units in the period would be calculated as follows: Sales are 60,000 units x $11/unit = $660,000. Manufacturing costs are 60,000 units x $8/unit = $480,000. Selling and administrative costs would consist of variable costs of 60,000 units x $1/ unit, or $60,000, and fixed costs of $45,000, for total costs of $105,000. $660,000 sales - $480,000 manufacturing costs - $105,000 selling and administrative costs = $75,000 reported income. This is $20,000 lower than the $95,000 budgeted amount.

5. $29,000 Since all cost relationships will remain unchanged if the special order of 4,000 units is accepted, the company will not have either a savings or an additional cost in terms of the fixed costs. As a result of losing the sale of 1,000 units, the company will lose the contribution margin on those sales. This is the difference between the sales price of $11/unit and the variable costs, which total $6/unit, representing a loss of $5,000 ($5 x 1,000 units). In addition, the company will incur additional variable costs of 4,000 units x $6/unit = $24,000. In order to avoid reducing income, the company will need revenues of at least $24,000 + $5,000 = $29,000 from the special order.

6. $4.59 To convert the percentage markup on selling price (MOP) to a percentage markup on cost (MOC), the following formula is helpful: MOC = MOP / (100% - MOP). MOC = 20% / (100% - 20%) = 25%. The minimal selling price is the cost of the product plus the gross margin at 20% markup on selling price (or 25% markup on cost) $3.67 + ($3.67 x 0.25) = $4.5875, which rounds to $4.59. To prove this answer, use the markup on the computed selling price and compare the answer to the cost: $4.59 x (1 – 0.20) = $3.67.

7. Make — The relevant costs to make the culture are $42 (direct material of $16, direct labor of $8, the variable overhead of $16, and the fixed overhead that can be eliminated of $2). This is cheaper than the purchase price of $44. The fixed overhead that cannot be eliminated is irrelevant to the decision.

8. Process further — It is most beneficial to process product A further. This course of action results in an increase of $45,000 to net income. The joint production costs are irrelevant, as they do not differ between the alternatives.

	A	B	C
Final sales value	$150,000	$180,000	$ 60,000
Less: Sales value at split-off	75,000	150,000	30,000
Equals: Incremental revenue	$ 75,000	$ 30,000	$ 30,000
Less: Incremental cost	30,000	30,000	45,000
Difference	$ 45,000	$ 0	$(15,000)

9. Either sell or process further — Financially, it is equally beneficial to either sell or process product B further. The decision has no impact on net income. The decision probably would be made based on qualitative or strategic factors. The joint production costs are irrelevant, as they do not differ between the alternatives. (Also see table in the explanation to item #8.)

10. Sell — From a financial perspective, it is most beneficial to sell product C at the split-off point. This course of action avoids a reduction of $15,000 to net income. The joint production costs are irrelevant, as they do not differ between the alternatives. (Also see table in the explanation to item #8.)

11. Keep — The fresh product line should not be eliminated because it contributes to covering the fixed costs of the division as a whole. The $1,500,000 of unavoidable fixed costs allocated to the fresh product line are irrelevant to this decision because they will continue regardless of the decision. Without the fresh product line, net income will decrease by $1,200,000, as outlined below. Alternatively, this difference may be derived by adding the unavoidable fixed costs back to the fresh product line's net loss (-$300,000 + $1,500,000 = $1,200,000).

Product line	Total division Keep fresh		Total division Eliminate fresh		Difference
Revenue (in 1,000s)		18,000		12,000	6,000
Variable costs		9,000		4,500	4,500
Contribution margin		9,000		7,500	1,500
Avoidable fixed cost	3,900		3,600		300
Unavoidable fixed costs	2,400		2,400		0
Fixed costs		6,300		6,000	300
Net income (in 1,000s)		2,700		1,500	1,200

Lecture 5.05 – Two Costing Systems: Job Order vs. Process Costing

Two methods of accumulating production costs in a manufacturing company and for allocating the costs to work in process, finished goods and cost of goods sold.

Job Order Costing

Job order costing is a system for allocating costs to groups of unique products. It is applicable to the production of customer-specified products. Each job becomes a cost center for which costs are accumulated. Job order costing is generally used when units are relatively expensive and when costs can be identified to specific units or batches of units. Because costs are traced to specific jobs, certain items that might otherwise be classified as manufacturing overhead (overtime premiums paid to accommodate a customer change order, for instance) are classified as direct costs.

- **Job order costing** – expensive, heterogeneous – cost based per **Job.**

Process Costing

Process costing, in contrast to job order costing, is applicable to a continuous process of production of the same or similar goods. Since the product is uniform, there is no need to determine the costs of different groups of products and each processing department becomes a cost center. Process costing is generally used when units are relatively inexpensive and when it is difficult to trace costs to specific units being produced, such as when units are mass-produced in large quantities.

- **Process costing** – inexpensive, homogeneous - costs per **Period.**
    - Equivalent "whole" units (80 × ¾ cc = 60 whole units) (cc = Conversion Cost)
        - **Weighted average method** (beginning + started)
        - **FIFO** (beginning first/ then started)

There are two methods of applying process costing to production. These are the weighted average method and FIFO.

Weighted Average

Under the weighted average approach, equivalent production for a period will include units that are **completed** during the period, considered whole units as to all costs, and units in process at the end of the period. The ending work-in-process will be converted into equivalent units based on the level of completion.

Total equivalent production will be divided into costs for the period to determine an average cost per equivalent unit. The costs included will be the costs associated with beginning inventory and the costs incurred during the period.

FIFO

Under the FIFO approach, equivalent production for a period will include the units that are **started and completed** during the period, considered whole units as to all costs. Both beginning and ending work-in-process inventory will be converted into equivalent whole units.

- For beginning inventory, the portion of the work that needed to be completed during the period will be multiplied by the number of units to determine equivalent production.

- For ending inventory, the percentage of completion will be multiplied by the number of units to determine equivalent production.

Total equivalent production will be divided into costs for the period to determine an average cost per equivalent unit. The costs included, however, will only be those costs that were incurred during the period.

Comparing Weighted Average to FIFO

The difference between weighted average and FIFO is the handling of beginning work-in-process inventory. When there is no beginning inventory, both will have the same result. When there is a beginning work-in-process inventory, the weighted average approach will yield a number of equivalent units that will be equal to or greater than equivalent production under FIFO.

- When costs are incurred at the end of the process, or at some point in the process that the beginning inventory had not yet reached, equivalent production will be the same under both approaches.
- When costs are incurred uniformly during the process, at the beginning of the process, or at some point in the process that the beginning inventory had already reached, equivalent production under weighted average would be greater than FIFO.

Weighted Average
TC*/Total Equivalent Units = Cost per Unit*

FIFO
*Costs **this Period**/Units Worked on **this period** = Cost per Unit*

Equivalent Production

One significant aspect of process costing is the computation of equivalent units. The objective is to analyze the period's production, including units completed and units partially completed, and determine the number of whole units the production is equivalent to.

The calculation of equivalent production will depend on the point in time at which costs are incurred.

- When costs are incurred at the beginning of the process, partially completed units will be considered equivalent to whole units as soon as they are started.
- When costs are incurred at a specific time during the process, such as when units are 40% complete, partially completed units will be considered equivalent to nothing until they reach that point and equivalent to whole units when that point is reached.
- When costs are incurred at the end of the process, partially completed units will be considered equivalent to nothing until completed, at which time they will be equivalent to whole units.
- When costs are incurred evenly throughout the process, the percentage of completion will be multiplied by the number of units in process to determine the number of equivalent whole units.

When a company has more than one manufacturing department, the costs are assigned to work-in-process and to goods transferred to the next department. In the subsequent department, the units transferred from a previous department are considered similar to a raw material that is added to the production cycle at the beginning of the process.

The Alexes Co. is the first of a two-stage production process. The following information concerns the conversion costs in May 20X3:

	Units	Conversion costs
Beginning work in process (60% complete)	30	$68
Units started	60	96
Spoilage — normal	0	$164
Units completed and transferred	50	
Ending work in process (80% complete)	40	

Using the Weighted-average and the FIFO methods, calculate equivalent whole units, the cost of goods completed and transferred, and ending inventory.

Weighted Average (Total Costs/Total Equivalent Whole units)

	units	% complete CC	Equivalent whole units	Costs
Beg. Units	30	60%		$ 68
Started	60			$ 96
Units to acct for	**90**			$ 164
Completed	50	100% =	50 × $2 = $100	
Spoilage	0			
End	40	80% Complete =	32 × $2 = $64 end $164	
Units to acct for	**90**		82 equiv. units	**$164**

Same under Both

W/A → What did you finish? Do not care where it came from.
TC/EU → EU = 50 completed + 40(0.8) = 82 equiv. Whole units
= $164/82 = $ 2 per unit
50 × $2 = $100 (COG completed)
32 × $2 = 64 (Ending Inventory)
$164

FIFO (Costs incurred THIS PERIOD/Units actually worked on THIS PERIOD)

	units	% complete CC	Equivalent whole units	Costs
Beg. Units	30	60%		$ 68
Started	60			$ 96
Units to acct for	**90**			$ 164
Completed	50	30 × 40%=12 20 × 100%=20	12 × $1.5 = 18 20 × $1.5 = 30 $48 + started 68 $116 Cogc	
Spoilage	0			
End	40	80% Complete =	32 × $1.5 = $48 end $164	
Units to acct for	**90**		64 equiv. units	**$164**

Same under Both

FIFO → What work did you perform *this period*?
Costs this period/Units Worked on this period
Units Worked on this period =

What did it take to make it 100% complete? Came in with 60%, so 40%.

The 30 units in beginning inventory were already 60% complete and the remaining 40% was required to complete them.

If 50 units were completed, 30 of which were from beginning inventory, there were 20 units that were started and completed in their entirety during the period.

Ending inventory is treated the same under FIFO as under weighted average. There are 40 units that are 80% complete.

Cost of goods completed will consist of:

- The costs in beginning inventory
- The cost to complete the units in beginning inventory (EU × cost per EU)
- The cost of units started and completed during the period (EU × cost per EU)

30 (from beginning)(.40) = 12 + 20(100%) = 32 + ending 40(.80) = 64 equiv. whole units
= \$96/64 = \$1.5 × 32 = \$48+ 68 = 116 (COG completed)
\$1.5 × 32 = 48 (Ending Inventory)
\$164.00

When a company produces large quantities of identical goods, it will often use **process costing** to determine the average cost per unit of products. When using this approach, costs are accumulated in work-in-process until the end of the period, and then a calculation is made of the cost per equivalent unit of products completed and incomplete at the end of the period.

For example, assume that a company had work-in-process at the beginning of the month of $30, associated with 2 units that were 50% complete at the time. During the month, it spent $150 and started an additional 8 units. At the end of the month, work-in-process consisted of 4 units that were 75% complete. Assume there was no spoilage in the production process.

The total cost in work-in-process before allocating is $30 + $150 = $180. With 2 units at the start and 8 more begun during the month, there were 10 units to account for at the end of the month. Since 4 were in process, 6 must have been completed. The **equivalent units** include the 6 that were completed and 4 × 75% = 3 equivalent units for the ending work-in-process, for a total of 9 equivalent units. The costs of $180 are allocated over 9 equivalent units at $20 per equivalent unit. Ending work-in-process is $20 × 3 equivalent units, or $60, and the remaining $120 must represent the costs associated with the 6 units completed and transferred to finished goods. To summarize:

	Units	**Costs**	**Cost / EU**	
Beg WIP (50%)	2	30		
Added	8	150		
To account for	10	180	180	
		EU		
	Units	**Costs**	**Cost / EU**	**Allocation @ $20**
End WIP (75%)	4	3		60
Completed	6	6		120
Accounted for	10	9	9	180
Cost / EU			20	

For costs added at the beginning of a process, the equivalent units are the same for work-in-process as they are for completed units. For example, if raw materials are added at the beginning of the process, the 4 units in process at the end of the month already have all the raw materials, and are assigned 4 equivalent units instead of 3.

Lecture 5.08 – Joint Product Costing – Class Questions

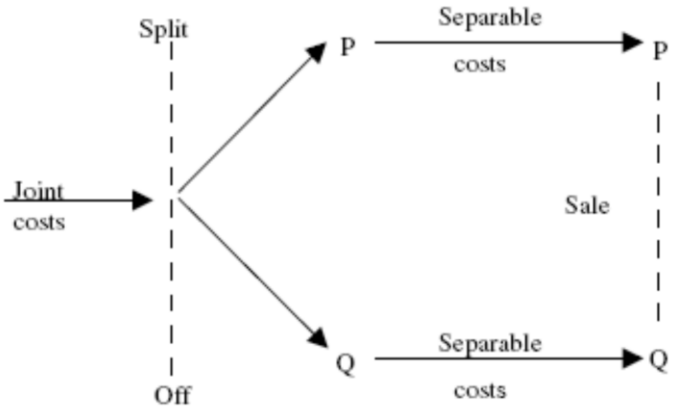
11. Lane Co. produces main products Kul and Wu. The process also yields by-product Zef. Net realizable value of by-product Zef is subtracted from joint production cost of Kul and Wu. The following information pertains to production in July 20X3 at a joint cost of $54,000:

Product	Units Produced	Market value	Additional cost after split-off
Kul	1,000	$50,000	$10,000
Wu	1,500	40,000	5,000
Zef	500	7,000	3,000

If Lane uses the net realizable value method for allocating joint cost, how much of the joint cost should be allocated to product Kul?

a. $18,800
b. $20,000
c. $26,667
d. $27,342

12. The diagram below represents the production and sales relationships of joint products P and Q. Joint costs are incurred until split-off, then separable costs are incurred in refining each product. Market values of P and Q at split-off are used to allocate joint costs.



If the market value of P at split-off increases and all other costs and selling prices remain unchanged, then the gross margin of

	P	Q
a.	Increases	Decreases
b.	Increases	
c.	Decreases	Decreases
d.	Decreases	Increases

Class Solutions

11. **(c)** The requirement is to determine how to allocate joint cost using the net realizable value (NRV) method when a by-product is involved. NRV is the predicted selling price in the ordinary course of business less reasonably predictable costs of completion and disposal. The joint cost of $54,000 is reduced by the NRV of the by-product ($4,000) to get the allocable joint cost ($50,000). Sales value at split off is $50,000 - $10,000 = $40,000 for Kul and $40,000 - $5,000 = $35,000 for Wu. The computation is

	Sales value at split-off	Weighting	Joint cost allocated
Kul	$40,000	40,000/75,000 × 50,000	$26,667
Wu	$35,000	35,000/75,000 × 50,000	$23,333
	$75,000		$50,000

Therefore, $26,667 of the joint cost should be allocated to product Kul.

When a process results in joint products and by-products, the net realizable value of the by-products generally is subtracted from joint costs first, resulting in the net cost of the joint process. The by-product Zef has a sales value of $7,000, but requires separable costs of $4,000, resulting in a net realizable value of $4,000. This reduces joint costs of $54,000 so that only $50,000 will be allocated to the joint products based on their relative sales value at the split-off point. Kul has a sales value of $50,000 with separable costs of $10,000, resulting in a sales value at split-off of $40,000. Wu has a sales value of $40,000 with separable costs of $5,000, resulting in a sales value at split-off of $35,000. As a result, $26,667 ($40,000/$75,000 × $50,000) will be allocated to Kul.

12. (**d**) If the market value of P increases at split off, and joint costs are being allocated between products P and Q based on relative sales value at split off, that means that P will get MORE of the costs based on the ratio. Therefore, if more costs are allocated to P and all other costs and selling prices remain unchanged, then the gross margin (sales – costs) will decrease for P and increase for Q.

Lecture 5.09 – Cost Accounting – Class Questions – TBS

Ester, Inc., is a medical laboratory that performs tests for physicians. Ester recently hired Cat's-eye Consultants to evaluate its costs. Ester performs between 4,000 and 12,000 tests during a month.

For items 1 through 8, determine and select from the choices below both the category and behavior.

Category
- A. Direct material cost
- B. Direct labor cost
- C. Overhead cost
- D. General and administrative cost

Behavior
- F. Fixed
- V. Variable

		Category				Behavior	
	Costs incurred by Ester	**(A)**	**(B)**	**(C)**	**(D)**	**(F)**	**(V)**
1.	Office manager's salary	○	○	○	○	○	○
2.	Cost of electricity to run laboratory equipment	○	○	○	○	○	○
3.	Hourly wages of part-time technicians who perform tests	○	○	○	○	○	○
4.	Cost of lubricant used on laboratory equipment	○	○	○	○	○	○
5.	Cost of distilled water used in tests	○	○	○	○	○	○
6.	Accelerated depreciation on laboratory equipment	○	○	○	○	○	○
7.	Straight-line depreciation on laboratory building	○	○	○	○	○	○
8.	Cost of expensive binders in which test results are given to physicians	○	○	○	○	○	○

For items 9 through 12, each calculate the numeric amount for each analysis item.

	Analysis item	**Amount**
9.	Contribution margin per unit	
10.	Breakeven point in units at low activity range	
11.	Breakeven point in units at high activity range	
12.	Number of units sold to achieve a gross profit of $160,000	

For items 13 through 15, determine and select from the choices below.
- A. Greater than the industry average
- B. The same as the industry average
- C. Less than the industry average

	Analysis item	Comparison to the industry average (A)	(B)	(C)
13.	Variable costs at low activity range	○	○	○
14.	Contribution margin at high activity range	○	○	○
15.	Breakeven point at high activity range	○	○	○

Exhibits

Excerpt from report of Cat's-eye Consultants

At the low range of activity (100 to 4,999 tests performed):	
Sales price per test	$60
Variable costs per test	20
Fixed costs	160,000
At the high range of activity (5,000 to 14,999 tests performed):	
Sales price per test	$60
Variable costs per test	20
Fixed costs	200,000

Excerpt from report from Medical Testing Association

Compared to industry averages, at the 100 – 4,999 tests/month range of activity, Ester has a lower sales price per test than industry average, higher fixed costs than industry average, and the same breakeven point in number of tests performed as industry average.

Compared to industry averages, at the 5,000 – 14,999 tests/month range of activity, Ester's sales price per test and fixed costs are the same as industry averages, and Ester's variable costs are lower than industry averages.

Task-Based Simulation Solution

1. Office manager's salary: General and administrative cost; Fixed.

The office manager is outside the production process; the office manager's salary is a general and administrative cost. The office manager's salary is constant regardless of the quantity of product produced (or tests performed). Direct material costs are the costs of material readily traced to the product (the tests). No salaries or wages are direct material costs. Direct labor costs are the costs of labor of those producing the product (the tests). The office manager is outside the production process. Overhead costs for testing are production costs.

2. Cost of electricity to run laboratory equipment: Overhead cost; Variable.

Overhead costs are production costs that cannot be traced to specific units of production readily. The laboratory equipment is being used to produce product (or perform the tests). The cost of electricity to run the laboratory equipment cannot be traced to specific tests readily;

hence, it is an overhead cost. The cost of electricity to run laboratory equipment varies with the quantity of product produced (or tests performed). While there often is a base charge every month regardless of quantity used, the amount typically is miniscule in comparison to the usage charge. Direct material costs are the costs of material readily traced to the product (the tests). The laboratory equipment is being used to produce product. The cost of electricity to run the laboratory equipment cannot be traced to specific tests readily. Direct labor costs are the costs of labor of those producing the product (the tests). Electricity is not labor. The laboratory equipment is being used to produce product (or perform the tests). The cost of electricity to run the laboratory equipment is a manufacturing cost, not a general or administrative cost.

3. **Hourly wages of part-time technicians who perform tests: Direct labor cost; Variable.**

   Direct labor costs are the costs of labor of those producing the product (the tests). The technicians who perform tests are part of the production process. The technicians' wages can be traced to specific tests readily. The technicians' wages vary with the quantity of product produced (or tests performed). Direct material costs are the costs of material readily traced to the product (the tests). No salaries or wages are direct material costs. Overhead costs are production costs that cannot be traced to specific units of production readily. The technicians' wages can be traced to specific tests readily. The technicians' wages are a manufacturing cost, not a general or administrative cost.

4. **Cost of lubricant used on laboratory equipment: Overhead cost; Variable.**

   Overhead costs are production costs that cannot be traced to specific units of production readily. The laboratory equipment is being used to produce product (or perform the tests). The cost of lubricant used on the laboratory equipment cannot be traced to specific tests readily; hence, it is an overhead cost. The cost of lubricant used on laboratory equipment varies with the quantity of product produced (or tests performed). While there conceivably is a minimal amount of lubricant that must be used if the equipment is idle to maintain the equipment, the amount would be miniscule in comparison to the quantity used even during low-volume periods. Direct material costs are the costs of material readily traced to the product (the tests). The cost of lubricant used on the laboratory equipment cannot be traced to specific tests readily. Direct labor costs are the costs of labor of those producing the product (the tests). Lubricant is not labor. The cost of lubricant used on the laboratory equipment is a manufacturing cost, not a general or administrative cost.

5. **Cost of distilled water used in tests: Direct material cost; Variable.**

   Direct material costs are the costs of material readily traced to the product (the tests). The distilled water cost can be traced to specific tests readily. The distilled water cost varies with the quantity of product produced (or tests performed). Direct labor costs are the costs of labor of those producing the product (the tests) that is readily traced to the product. Distilled water is not labor. Overhead costs are production costs that cannot be traced to specific units of production readily. The distilled water cost can be traced to specific tests readily. The distilled water cost is a manufacturing cost, not a general or administrative cost.

6. **Accelerated depreciation on laboratory equipment: Overhead cost; Fixed.**

   Overhead costs are production costs that cannot be traced to specific units of production readily. The equipment is being used to produce product (or perform the tests) so its related depreciation is a manufacturing cost. The depreciation cannot be readily traced to specific units. The depreciation on the laboratory equipment is constant regardless of the quantity of product produced (or tests performed). The fact that it will be a different amount next year

owing to the nature of accelerated depreciation is irrelevant to classification as fixed or variable. Only if the depreciation was based on a variable charge method would it be a variable cost. Direct material costs are the costs of material readily traced to the product (the tests). Depreciation cannot be readily traced to specific units. Direct labor costs are the costs of labor of those producing the product (the tests) that is readily traced to the product. Depreciation is not labor. The depreciation on the laboratory equipment is a manufacturing cost, not a general or administrative cost.

7. Straight-line depreciation on laboratory building: Overhead cost; Fixed.

Overhead costs are production costs that cannot be traced to specific units of production readily. The building is being used to produce product (or perform the tests) so its related depreciation is a manufacturing cost. The depreciation cannot be readily traced to specific units. The depreciation on the laboratory building is constant regardless of the quantity of product produced (or tests performed). Direct material cost: Direct material costs are the costs of material readily traced to the product (the tests). Depreciation cannot be readily traced to specific units. Direct labor cost: Direct labor costs are the costs of labor of those producing the product (the tests) that is readily traced to the product. Depreciation is not labor. The depreciation on the laboratory building is a manufacturing cost, not a general or administrative cost.

8. Cost of expensive binders in which test results are given to physicians: Direct material cost; Variable.

Direct material costs are the costs of material readily traced to the product (the tests). The binders are readily traced to specific units. The cost of binders for test results varies with the quantity of product produced (or tests performed). Direct labor costs are the costs of labor of those producing the product (the tests) that is readily traced to the product. Binders are not labor. Overhead costs are production costs that cannot be traced to specific units of production readily. The binders are readily traced to specific units. The cost of binders for test results is a manufacturing cost, not a general or administrative cost.

9. $40 The contribution margin per test is the difference between the sales price of $60 and the variable costs of $20, resulting in a contribution margin of $40 per test. This is the same in both activity ranges.

10. 4,000 The breakeven point at the low range is equal to fixed costs of $160,000 in the low range divided by the contribution margin per unit of $40, resulting in a breakeven point of 4,000 units.

11. 5,000 The breakeven point at the high range is equal to fixed costs of $200,000 in the high range divided by the contribution margin per unit of $40, resulting in a breakeven point of 5,000 units.

12. 9,000 To achieve a gross profit of $160,000, Ester would have to sell enough units to cover variable costs, fixed costs, and provide the desired gross profit. The desired gross profit could not be achieved at the maximum capacity in the low range, indicating that Ester will have to operate in the high range to achieve the goal. The number of units required can be calculated by dividing the total of the desired gross profit of $160,000 and the fixed costs at the high range of $200,000 by the contribution margin per unit. The amount is $360,000/$40 per unit, or 9,000 units.

13. Variable costs at low activity range: C. Less than the industry average

The report from the Medical Testing Association states that, at the low range of activity, Ester has a lower sales price, higher fixed costs, and the same breakeven point in number of tests as others in the industry. The breakeven point is that point when the operating profit is $0; thus, at the breakeven point, contribution margin = fixed costs. As Ester's fixed costs are higher than average, Ester's contribution margin is higher than others. Contribution margin is the difference between the sales price and the variable costs. As Ester has a lower than average sales price, the higher contribution margin must be the result of lower than average variable costs.

14. Contribution margin at high activity range: A. Greater than the industry average

The report from the Medical Testing Association states that, at the high range of activity, Ester's sales price per test is the same as industry averages and Ester's variable costs are lower than industry averages. Contribution margin is the difference between the sales price and the variable costs. As Ester has the same sales price at the high range as others in the industry and has lower variable costs, Ester's contribution margin would be higher.

15. Breakeven point at high activity range: C. Less than the industry average

The report from the Medical Testing Association states that, at the high range of activity, Ester's sales price per test and fixed costs are the same as industry averages, and Ester's variable costs are lower than industry averages. Contribution margin is the difference between the sales price and the variable costs. The breakeven point is that point when the operating profit is $0; thus, at the breakeven point, contribution margin = fixed costs. With a higher contribution margin at the high range than others in the industry, along with the same fixed costs as others, Ester would have a lower breakeven point than others.

Lecture 6.06 – Performance Measures

Organizations use performance measures to monitor and manage various aspects of their performance for the organization as a whole and across its various subparts.

Organizations often use **Balanced Scorecards** to help ensure that they are following and implementing their mission and strategic plans. Balanced Scorecards commonly include *performance measures* that may be grouped across into various *perspectives:*

- **Financial perspectives** involve measures of profitability (return on investment, residual income, etc.), revenue, profit, or asset growth, and soundness (debt and equity ratios, etc.).
- **Customer perspectives** involve measuring customer satisfaction (such as through surveys) and retention.
- **Internal business process perspectives** involve measuring averages and variances in the cost, time (i.e., *cycle time*), and *number of defects* involved in producing and delivering a product or service. These perspectives may play a role in promoting **innovation** within organizations.
- **Learning and growth perspectives** seek to ensure that key drivers of organizations' long-term ability to carry out their mission (e.g., employees and their ability to use and access necessary technology) are not neglected in the pursuit of shorter-term objectives. To ensure this balance, organizations may, for instance, track their employees' satisfaction, training, and advancement.

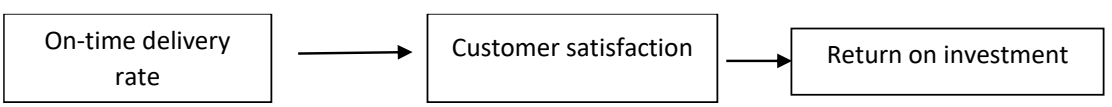
A balanced scorecard commonly includes:

- **Strategic objectives –** A statement of the firm's goals and what is needed to achieve them.
- **Performance measures –** The quantitative methods to be used to determine how much of the strategic objectives are being reached (yardstick).
- **Baseline performance –** How well the firm is doing under each performance measure.
- **Targets –** The amount of improvement being sought for each performance measure.
- **Strategic initiatives –** What specific changes the firm will undertake to achieve its objectives (and targets).

Organizations may seek to identify **cause-and-effect linkages** across their initiatives and changes in various performance measures. These efforts may help to identify which performance measures are actually **performance drivers** (leading indicators) and which are **outcome performance measures** (lagging indicators). Organizations would thus be better able to focus on the drivers that are most critical to achieving their strategic objectives. **Data mining** may also be used, which is the sorting through data to identify patterns and establish relationships, to bring to light previously unidentified relationships. Some of the parameters include association, sequence or path analysis, classification, clustering and forecasting (predictive analytics).

Sunk costs are current costs associated with past decisions that are largely unavoidable, and that are thus largely irrelevant to such analyses.

Organizations using the balanced scorecard framework use **Strategy maps** (i.e., diagrams) to help identify cause-and-effect relationships:



Decision Trees - Managers constantly face decisions for which they cannot have all relevant information initially. As any project evolves, managers have to respond to changing prices, to sales and costs that differ from their initial projections, and to all sorts of new developments, including new investment alternatives, and whether to expand the project further or to retrench. Managers may use decision trees as graphical aids to highlight the chains of decisions that will or will not happen under various scenarios (e.g., if X happens, then the choices about Y are…).

Value-Based Management (VBM) seeks to examine all aspects of a company (as in a **financial scorecard**) to identify the **economic value added (EVA)** that different activities contribute. (EVA is defined as net operating profit after taxes minus the cost of capital). VBM seeks to determine each activity's financial value (or contribution) to the firm. However, if misapplied, VBM may focus on the activities for which it is easiest to link costs to value creation, and fail to reflect that some activities do lead to value creation, even if the links from cost to value creation are less easy to identify. For instance, cost cutting may yield value in the short term, but not in the long term. Similarly, research expenditures may yield value in the long term, or erratically, or through improvements that are shared with other departments but with enhancements in revenues never clearly credited to the research expenditures.

A *value chain* is the sequence of business processes through which a product or service becomes more valuable (or useful), by converting inputs into outputs.

Real Options Techniques treat each business investment decision (i.e., project) as the purchase of a series of options to be exercised as the project evolves. The value of these chains of options is not reflected when managers focus solely on expected cash flows.

Profitability Ratios

Return on Investment (based on assets) = Net income / Total assets or Average invested capital

DuPont ROI analysis: ROI = Return on sales × Asset turnover

- **Return on sales =** Net income / Sales
- **Asset turnover** = Sales / Total assets

Residual income = Operating profit – Interest on investment

- **Interest on investment =** Invested capital × required rate of return

Economic Value Added: EVA = Net operating profit after taxes (NOPAT) – Cost of Financing

- **Cost of financing =** (Total assets – Current Liabilities) × Weighted average cost of capital

Free Cash Flow = NOPAT + Depr + Amort – Capital expenditures – Net increase in working capital

Benchmarking

Benchmarking involves evaluating performance (producing products, delivering services, etc.) on an ongoing basis across subdivisions within an organization and relative to historical and current performance within and outside the organization. Organizations engage in benchmarking in part to identify "best practices" that may then be adopted more widely across the subdivisions of the organization. Common types of benchmarking include:

- **Internal benchmarking:** To track, for instance, how well various subdivisions within one firm carry out one task. Generally, the information is relatively easy to obtain. The disadvantage is that improvement may be limited to the best that one subdivision is doing;

external benchmarking may result in more dramatic improvements. For instance, reducing the employee time to process a vendor invoice and issue a check from 29 minutes to 14 minutes is impressive, until compared with 2 minutes to process an electronic funds transfer (EFT).

- **Competitive benchmarking:** To track how well one firm performs relative to its most direct competitors. This may yield dramatic improvements, but the information often is difficult to obtain; while some of this information is directly observable by the public, obtaining this information typically is very difficult as competitors have little incentive to assist and many incentives to protect their competitive advantages.
    - *Cross-sectional analysis:* exploring data for one time period for multiple firms (i.e., including one's firm and other firms) in the same industry.
    - *Time-series analysis:* exploring data for one firm over time.
    - *Panel data analysis:* exploring data for multiple firms over time (i.e., panel data analysis uses both multiple firms and multiple time periods).
- **Industry benchmarking:** To track one firm against its industry as a whole, instead of against only its direct competitors.
- **Generic benchmarking:** To track one firm against all firms, even if outside its industry. Benchmarking is likely to be more relevant the more alike the firms are that one compares against. Of course, obtaining data is usually easier the broader the category of firms one uses.

Quality Control

The International Organization of Standards (ISO) has developed a series of **ISO Quality Standards**).

- **ISO 9000 Series –** including five parts (9000 to 9004) focusing on the *quality* of products and services provided by firms.
- **ISO 14000 Series –** focusing on environmental goals.

According to the **Pareto Principle,** 80% of quality problems result from only 20% of the possible causes. Thus, firms should first focus on the most important causes of problems, and only later address less important cases.

Six-Sigma Quality is a statistical measure of the percentage of products that are in acceptable form (i.e., achieve the firm's quality goals), based on standard deviation measures (hence the name sigma). To achieve one sigma, 68% of products must be acceptable. To achieve six sigmas, 99.999997% of products must be acceptable. Six-sigma constitutes the practical hypothetical goal of perfection in manufacturing, with only 3.4 defects per million units.

Total quality management (TQM) is an entity-wide effort to continuously improve the ability to deliver high quality products and services by attending to systematic analysis; thus, it includes insights from suppliers as well as employees. It now is largely supplanted by six sigma and ISO programs; however, concepts from TQM often appear (in more evolved and formal versions) in implementation of these later perspectives.

Businesses may apply the **theory of constraints (TOC)** to maximize their operating income and overcome bottlenecks in their operations. Under TOC, if demand exceeds capacity for a resource, the resource is defined as a **bottleneck resource**. If capacity exceeds demand, the resource is defined as a **non-bottleneck resource**. TOC seeks to simultaneously maximize throughput contribution and minimize investment and operating costs.

- **Throughput contribution** equals revenues minus the direct materials cost of goods sold (COGS)**.**
- **Investment** equals the cost of materials, work in process, inventories; research and development expenses; and (upfront) expenses on equipment and buildings.
- **Operating costs** equals employee compensation, rents paid, utilities (electricity, garbage collection, etc.), and depreciation (e.g., of equipment and buildings).

Cost of Quality

This philosophy argues that failures have causes, that preventing failures is cheaper than having to address failures after they take place, and that measuring a firm's performance in implementing the cost of quality philosophy can be achieved and will help the firm. The costs related to addressing quality issues rise the later in the production process that the firm deals with the quality problems. There are *four different stages* at which costs can be addressed:

- **Prevention costs** – seeking to prevent quality failures
    - Using high-quality materials
    - Inspecting the production process
    - Focusing engineering and design to improve quality
    - Providing training to employees that focuses on improving quality
    - Quality circles
    - Maintenance of equipment (machines, etc.)
- **Appraisal (or detection costs)** – expenses on detecting quality failures
    - Inspecting samples of materials, in-process, and finished goods
    - Obtaining information from customers
- **Internal failure costs –** expenses addressing quality failures that were detected after production but before they were shipped to customers
    - Disposing of scrap resulting from wasted materials
    - Reworking units to correct defects
    - Re-inspecting & retesting after rework
- **External failure costs –** expenses addressing defective products that reached customers
    - Warranty costs
    - Expenses addressing customer complaints
    - Product liability costs
    - Cost of product returns
    - Marketing to help maintain and/or improve the firm's image
    - Losses of future sales, your reputation

Costs of conforming to quality control standards are called **Conformance costs** = prevention + appraisal costs.

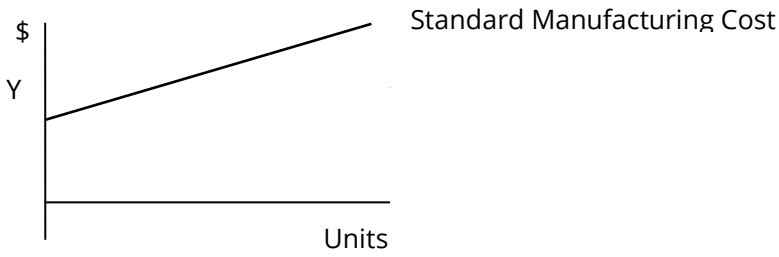
Costs of failure of quality controls are called **Nonconformance costs** = internal + external failure costs.

Lecture 6.11 – Planning, Control & Analysis – Class Questions – TBS

Gilligan, Inc. commenced operations on January 2, 20X3. Gilligan's three products (Aster, Begonia, and Cosmos) are produced in different plants located in the same community.

- Gilligan prepared standard absorption costing statements using full capacity (based on machine hours) to allocate overhead costs.
- Fixed costs are incurred evenly throughout the year.
- There is no ending work-in-process.
- Material price variances are reported when raw materials are taken from inventory.
- Apart from initial build-ups in raw materials, and finished goods inventories, production schedules are based on sales forecasts.

Gilligan uses the graph below to estimate Aster's total standard manufacturing cost.



Based on this information and the information on the Resources tab, answer the following questions.

For items 1 through 13, determine whether the answer is **(Y)** yes or **(N)** no.

___ **1.** Should Gilligan include standard indirect material costs in standard fixed overhead costs?

___ **2.** Should Gilligan categorize the operation of production equipment as a value-adding activity?

___ **3.** If Gilligan's three products were produced in a single plant, would activity-based costing provide more useful total production cost information for Aster, Begonia, and Cosmos than traditional standard costing?

___ **4.** Is the regression analysis technique helpful in determining the variable cost component of Gilligan's manufacturing overhead costs?

___ **5.** In Gilligan's internal performance reports, should normal spoilage costs be reported in fixed manufacturing overhead costs?

___ **6.** The computation of Begonia's normal spoilage assumes 10 units in 1,000 contain defective materials and, independently, 15 units in 1,000 contain defective workmanship. Is the probability that is used in computing Begonia's normal spoilage less than 0.025?

___ **7.** Gilligan has contracted to sell units of Aster to a customer in a segregated market during the offseason. Ignore variances and the costs of developing and administering the contract. Standard cost patterns are unchanged, except that variable selling and administrative costs are one-half the standard rate. Gilligan will sell Aster at a price which

recoups the variable cost of goods sold at the standard rate, plus variable selling and administrative costs at one-half of the standard rate. Will Gilligan break even on the contract?

___ **8.** Were the actual 20X3 direct labor hours used in manufacturing Aster less than the standard hours?

___ **9.** Would Aster's 20X3 operating income reported using absorption cost be lower than the amount reported using variable costing?

___ **10.** Was the total amount paid for direct materials put into process for the manufacture of Aster more than the standard cost allowed for the work done?

___ **11.** Gilligan is considering investing $60,000 in a 10-year property lease that will reduce Aster's annual selling and administration costs by $12,000. Gilligan's cost of capital is 12%. The present value factor for a 10-year annuity at 12% is 5.65. Is there a positive net present value for the lease investment?

___ **12.** Gilligan is considering investing $60,000 in a 10-year property lease that will reduce Aster's annual selling and administration costs by $12,000. Gilligan's cost of capital is 12%. The present value factor for a 10-year annuity at 12% is 5.65. Is the internal rate of return for the lease investment lower than the cost of capital?

___ **13.** Does Gilligan practice a just-in-time philosophy?

For item 14, select from the following list: **(A)** Increase, **(B)** Decrease, or **(C)** No effect.

___ **14.** If Gilligan sells $10,000 more of Begonia and $10,000 less of Cosmos, what is the effect on Gilligan's standard dollar breakeven point?

For items 15 through 18, select from the following list: **(A)** Aster, **(B)** Begonia, or **(C)** Cosmos

___ **15.** For which product is evaluation of investments by the payback method likely to be more appropriate?

___ **16.** For which product is the economic order quantity formula likely to be most useful when purchasing raw materials to be used in manufacturing?

___ **17.** Which product had the greatest actual return on investment?

___ **18.** Ignore 20X3 reported variances and assume that Gilligan used expected demand to allocate manufacturing overhead costs. Which product would be most likely to have a substantial percentage of under-applied or over-applied fixed manufacturing overhead costs on quarterly statements?

___ **19.** What is Aster's budgeted standard per unit cost for variable selling and administrative costs on sales of 75,000 units?

___ **20.** What is Aster's budgeted standard fixed selling and administrative costs on sales of 75,000 units?

___ **21.** What is Gilligan's standard breakeven point in sales dollars for the actual sales mix achieved?

___ **22.** What amount of Aster's direct material and direct manufacturing labor variances might be regarded, wholly or partially, as direct manufacturing labor employees' responsibility?

___ **23.** What amount does the Y represent on Aster's total standard manufacturing cost graph?

Exhibits

Excerpt from Gilligan's Utilization Study

	Aster	*Begonia*	*Cosmos*
* Manufacturing Capacity Utilization	75%	80%	70%
* Average Investment	$1,000,000	$800,000	$400,000
* Demand	Somewhat seasonal and moderately difficult to project more than 3 years	Constant and easy to project more than 3 years	Very seasonal and very difficult to project more than 3 years

Excerpt from Gilligan's internal 20X3 contribution margin income statement, based on standard costs

Gilligan, Inc.
20X3 CONTRIBUTION MARGIN INCOME STATEMENT

Products	***Aster***	***Begonia***	***Cosmos***	***Total***
Sales (Aster 80,000 units)	$1,200,000	$800,000	$500,000	$2,500,000
Standard Costs:				
Direct Material	180,000			
Direct Labor (Aster 20,000 hours)	240,000			
Variable Manufacturing Overhead	80,000			
Total Variable Manufacturing Costs	500,000		(Detail omitted)	
Less: Finished Goods Inventory 12/31/X3	100,000			
Variable Cost of Goods Sold	400,000			
Variable Selling and Administrative Costs	120,000			
Total Variable Costs	520,000			
Standard Contribution Margin	680,000	176,000	144,000	1,000,000
Fixed Manufacturing Overhead Costs	440,000			
Fixed Selling and Administrative Costs	140,000		(Detail omitted)	
Total Fixed Costs	580,000			
Standard Operating Income	100,000	35,000	25,000	160,000
Variances - Favorable **F**/ Unfavorable **U**:				
Direct Materials - Price	2,000 F			
Usage	16,000 U			
Direct Labor - Rate	12,000 U		(Detail omitted)	
Efficiency	24,000 U			
Manufacturing Overhead - Total	43,000 U			
Selling and Administrative - Total	7,000 U			
Operating Income, Net of Variances	$ -0-	$ 41,000	$ 36,000	$ 77,000

Task-Based Simulation Solution

1. N Indirect materials generally are treated as a variable overhead cost, rather than a fixed overhead cost. Greater amounts of indirect materials are used in periods of higher production, unlike fixed costs that are incurred evenly throughout the production period.

2. Y Production equipment is used in the manufacture of the product. As a result, the operation of production equipment is a value-adding activity.

3. Y Under traditional product standard costing, costs are allocated to production based on a single factor used to determine the predetermined overhead rate. In activity-based costing, different costs are allocated to production using different bases. It would be difficult to find a single base for allocating costs that would be appropriate for all three of these products. This circumstance suggests that activity-based costing would be more appropriate when the three products are produced in a single plant.

4. Y Regression analysis is a tool that can be used to determine the fixed and variable components of costs so that they can be estimated at various levels of production. Regression analysis would be helpful in determining the variable cost component of Gilligan's manufacturing overhead costs.

5. N In a manufacturing situation, normal spoilage occurs as a part of the production process. There is a relationship between the amount of spoilage incurred and the volume of production. Generally, more spoilage is experienced in periods of high production than in periods of low production. As a result, normal spoilage is a variable rather than a fixed cost.

6. Y A total of 1% of units contain defective materials and 1.5% contain defective workmanship. Some units will contain both types of defects. As a result, less than 2.5% of the units produced will be defective.

7. Y Gilligan is working at only 75% of capacity in the manufacture of Aster, indicating there is capacity to accept a special order that uses 25% or less of capacity in the manufacture of Aster. As standard cost patterns are unchanged—except the variable selling and administrative costs, indicating that there will be no additional fixed costs resulting from accepting the order, Gilligan would have to recover only variable costs to break even on the special order. If units can be sold for an amount equal to the standard variable cost of goods sold and one-half of the ordinary standard variable selling and administrative costs, when those will be the actual variable costs, Gilligan would break even on the sale.

8. N There is an unfavorable direct labor efficiency variance. This indicates that units took longer to produce than expected and that actual direct labor hours used exceeded the standard hours.

9. N Since this is Gilligan's first year of operations, there would be no beginning inventories; however, there are ending inventories. In periods in which inventory increases, a company will report a higher income under absorption costing than under variable costing. This is due to the fixed overhead being included in inventory under absorption costing and being expensed under variable costing.

10. Y Aster reported a favorable material price variance of $2,000 and an unfavorable usage variance of $16,000, resulting in an unfavorable net variance of $14,000. An unfavorable

net variance indicates that, overall, more was paid for materials than the standard amount.

11. Y The present value of the savings in selling and administrative costs would be $12,000 × 5.65 or $67,800. This is reduced by the investment of $60,000 to give a positive net present value of $7,800.

12. N The present value of the savings at 12% is $12,000 × 5.65 or $67,800, which is greater than the investment of $60,000. The internal rate of return (IRR) on the investment would be the rate at which the present value would be equal to $60,000, making the internal rate of return on the investment greater than 12%. Since 12% is Gilligan's cost of capital, the IRR on the investment is higher than the cost of capital.

13. N Under a just-in-time approach, a company would maintain low levels of inventory and production schedules would be based on demand. Gilligan's production schedules are based on sales forecasts rather than demand. This indicates that Gilligan is not following a just-in-time approach.

14. I Begonia has a contribution margin ratio of 22% based on a contribution margin of $176,000 and sales of $800,000. Cosmos has a contribution margin ratio of 28.8% based on a contribution margin of $144,000 and sales of $500,000. The higher the proportion of sales of products with higher contribution margin ratios, the lower the breakeven point will be. Increasing sales of a product with a low contribution margin and decreasing sales of a product with a higher contribution margin will increase the breakeven point.

15. C Demand for Cosmos is very difficult to project more than 3 years. Net present value and internal rate of return models rely heavily on forecasts for the entire life of a project, but the payback period model typically is concerned about only the early years of a project. Demand for Cosmos might not exist after 3 years. Gilligan would be concerned about at least being able to recover an investment within a 3-year period. As a result, the payback method would be most appropriately applied to Cosmos.

16. B The economic order quantity formula is the square root of 2AP/S with A equal to annual demand for the product, P the cost of placing an order or setting up a production run, and S the cost of carrying a unit of inventory for one year. In order to apply the formula, demand must be predictable. Since it is easy to project demand for Begonia, the economic order quantity formula would be most useful applied to that product.

17. C Return on investment (ROI) is operating income divided by average investment. Aster has an actual ROI of $0/$1,000,000 or 0%. Begonia has an actual ROI of $41,000/$800,000 = 5.125%. Cosmos has the highest actual ROI of $36,000/$400,000 = 9%.

18. C When expected demand is used to allocate overhead costs, the same amount of fixed overhead (FOH) would be applied to each unit. In periods of high production, however, the actual FOH per unit is lower than in periods of low production. As a result, a product that is very seasonal, like Cosmos, would have large FOH variances during interim periods, even though the variances will offset one another over the year.

19. $1.50 Aster has standard variable selling and administrative costs of $120,000 based on production of 80,000 units. Since 75,000 units is within the same relevant range, the per unit standard variable selling and administrative costs would be the same as for 80,000 units, $120,000/80,000 or $1.50 per unit.

20. $140,000 Standard fixed selling and administrative costs for Aster is the same on sales of 75,000 units as on sales of 80,000 units. The standard fixed selling administrative costs for Aster at 80,000 units is $140,000.

21. $2,100,000 Gilligan has a contribution margin of $1,000,000 based on sales of $2,500,000, indicating a contribution margin ratio of 40%. With operating income of $160,000, fixed costs must be $840,000 (i.e., $2,500,000 sales - $1,500,000 variable costs = $1,000,000 contribution margin – $840,000 fixed costs = $160,000 operating income). The breakeven point in dollars is equal to fixed costs divided by the contribution margin ratio = $840,000/40% = $2,100,000.

22. $40,000 Direct labor employees may be responsible for variances relating to the use of raw materials and the efficiency of the manufacturing process. As a result, they may be partially or wholly responsible for the $16,000 unfavorable material usage variance and the $24,000 unfavorable labor efficiency variance, for a total of $40,000. As both of these variances are unfavorable, they do not offset each other. Direct labor employees generally are not considered responsible for the price of raw materials or assigning employees to tasks, and thus, determining the labor rate. Thus, neither the direct material price variance nor the direct labor rate (price) variance are their responsibility.

23. $440,000 Point Y intersects the cost axis at zero units. Thus, Y represents the amount of manufacturing costs that will be incurred if no units of Aster are produced. As a result, it is equal to Aster's fixed manufacturing costs of $440,000.

Information Technology

Lecture 7.01 – Information Technology Role in Business

The use of computers first focused on relieving humans of the tedious work involved in general recordkeeping and reporting. Now, regulatory requirements include electronic reporting. For instance, the IRS requires electronic submission of many business tax returns.

Transaction processing systems focus on relieving humans of the tedious work involved in general recordkeeping and reporting. **Management reporting systems** assist in the decision-making process within the organization. The most common business systems include:

- *Management information system* – (MIS) An organized assembly of resources and procedures required to collect, process, and distribute data for use in decision making.
- *Decision support system* – (DSS) An interactive system that provides the user with easy access to decision models and data, to support semi-structured decision-making tasks.
- Enterprise Resource Planning (ERP) is a packaged business software system that allows an organization to automate and integrate the majority of its business processes (sales, inventory management, planning and forecasting), share common data and practices across the entire organization, and produce and access information in a real-time environment. These systems span both transaction processing systems and management reporting systems. Examples of ERP include SAP, Oracle Financials, and J.D. Edwards.
- *Executive support information system* – Systems designed specifically to support executive work (nonroutine decision, helps answer questions regarding competitors and identify new acquisitions).
- *Analytical processing system* – software technology that enables the user to query (ask) the system, retrieve data and conduct analysis.
- *Expert system* – The most prevalent type of computer system that arises from the research of artificial intelligence. An expert system has a built-in hierarchy of rules, which are acquired from human experts in the appropriate field. Once input is provided, the system should be able to define the nature of the problem and provide recommendations to solve the problem.

Connectivity

The Internet and related Web technologies ushered in a paradigm shift from the computer as a number-crunching device to a communication tool. This paradigm shift was aided by significant declines in computing costs coupled with dramatic increases in computing power in the last several decades.

Since the introduction of smart phones in 2007, the Internet has driven another shift—from desktop devices to mobile devices and tablets. Thus, computing is being even more fully integrated into daily life.

For example, in the number-crunching phase, businesses started using computers to record the sales made each day at a store and then made by each cashier, then a computer at the store recorded each sale and concurrently updated the inventory files. In the communicating phase, the

cashier's computer automatically contacts the credit card company to confirm that the customer's available credit limit is sufficient for the purchase. Businesses websites started with contact information and driving directions and evolved to online retail sites.

Obviously, businesses still are using the number-crunching aspect of computers. Indeed, automation of many tasks once performed by humans is ubiquitous. The communications aspect's applicability to accounting might be less obvious.

For example, decades ago, employees submitted physical copies of receipts and a printed expense report to the accounting department. An A/P clerk reviewed the report, coded expenses by category, confirmed expenses meet per diem and other limits, and requested supervisor approval. After the report was approved, the A/P clerk submitted a paper payment voucher. A check was issued for the employee to take to his or her bank and deposit.

Now, employees use smartphones to take a picture of any paper receipts. They might use the smartphone linked to a credit card to pay for expenses. Employees submit electronic copies of receipts to a website that "reads" the receipts, suggests likely categories, confirms that expenses meet *per diem* and other limits, and requests supervisor approval. After the report is approved, an A/P clerk reviews the categories (lodging, airfare, local transportation, meals, etc.) to ensure they are correct and submits an electronic payment voucher. An electronic payment is issued to the employee's bank account.

While these computers are keeping records, they also are communicating with each other: the employee's smartphone with the credit card company servers, the employee's tablet that gets an e-mail with a receipt from the taxi driver's smartphone, the employee's tablet and smartphone with the server hosting the expense website, the expense website server with the supervisor's laptop and the employer's servers, and the A/P clerk's desktop with the bank's servers.

A distributor's computer likewise can communicate with manufacturers' and retailers' computers, ordering and shipping product without each shipment being initiated directly by a human.

The ubiquitous nature of computers make it important that their systems are operating as designed.

Control Objectives for Information and Related Technology (COBIT)

ISACA (formerly Information Systems Audit and Control Association) has developed a framework, referred to as Control Objectives for Information and Related Technology (COBIT), for the governance and management of enterprise IT (Information Technology). In 2012, ISACA issued COBIT 5, the most recent iteration of the framework. The COBIT framework is business oriented in that it provides a systemic way of integrating IT with business strategy and business risk.

COBIT 5 helps enterprises of all sizes:

- Maintain high-quality information to support business decisions
- Achieve strategic goals and realize business benefits through the effective and innovative use of IT
- Achieve operational excellence through reliable, efficient application of technology
- Maintain IT related risk at an acceptable level
- Optimize the cost of IT services and technology
- Support compliance with relevant laws, regulations, contractual agreements and policies

COBIT 5 is based on 5 core principles around which an effective governance and management framework can be established, the goal of which is to maximize the benefit provided to stakeholders by their investment in information and technology.

The 5 core principles relate to:

- Meeting stakeholder needs
- End-to-end application
- Development of a single integrated framework
- Enabling a holistic approach
- Separating governance from management

Meeting Stakeholder Needs

The objective of an entity is to bring value to stakeholders, which may be in the form of financial return, as in the case of a "for profit" entity, or public service, as in the case of a not-for-profit entity. Regardless of how stakeholders define value, stakeholder needs are met through balancing the realization of benefits while optimizing risk and resource use. ISACA suggests the use of a "goal cascade" to customize COBIT 5 to create stakeholder value.

The goal cascade consists of 4 steps:

1. Factors influencing stakeholder needs are identified.
2. Stakeholder needs are translated into generic goals of the entity. COBIT 5 suggests 17 *generic entity goals* that fall into 4 categories. The list is comprehensive, although not intended to be all inclusive:
    - Financial
    - Customer
    - Internal
    - Learning and growth
3. IT-related goals are derived from the generic entity goals. COBIT 5 also suggests 17 IT goals that fall into the same 4 categories.
4. IT-related goals are next translated into what COBIT 5 refers to as **enabler** goals. Enablers are the processes, structures, and information that enable the entity to achieve its goals.

Financial goals include:

- Value of business investments
- Competitive products and services
- Safeguarding of assets
- Compliance
- Transparency

Customer goals include:

- Culture of customer service
- Service continuity and availability
- Ability to respond to change
- Strategic planning based on information model
- Optimization of costs of delivering products or services

Internal goals include:

- Optimizing functionality of business functions
- Optimizing process costs
- Management of change
- Productivity
- Compliance with policies

Learning and growth goals include:

- Capable, motivated personnel
- Culture of innovation

End-to-End Application

There are 2 respects in which COBIT 5 addresses the management and governance of IT applying an end-to-end approach to the enterprise.

- The system of governance for IT should "seamlessly" integrate into the system of governance for the enterprise as a whole.
- Systems for the governance and management of IT should apply to all components of the entity in which information is processed, both internally and externally.

Application of a Single Integrated Framework

COBIT 5 is considered a single integrated framework because it incorporates or aligns with other relevant standards and frameworks, allowing COBIT 5 to be applied to the enterprise as a whole.

Enabling a Holistic Approach

COBIT 5 describes 7 categories of enablers and indicates that each enabler requires inputs from, and delivers outputs to, other enablers that are necessary for the enablers to be fully effective. The categories are:

- Principles, policies, and frameworks, which apply to all other enablers
- Processes
- Organizational structure
- Culture, ethics, and behavior
- Information, which is also a resource
- Services, infrastructure, and applications, which are also resources
- People, skills, and competencies, which are also resources

Separating Governance from Management

COBIT 5 distinguishes between governance and management.

- Governance determines enterprise objectives, taking into account stakeholder needs, and sets direction for the entity.
- Management oversees the entity's activities toward achieving enterprise objectives in alignment with governance's direction.
- Ensures that stakeholders' needs, conditions and options are evaluated to determine balanced, agreed-on enterprise objectives to be achieved; setting direction through prioritization and decision making; and monitoring performance and compliance against agreed-on direction and objectives.
- Management plans, builds, runs and monitors activities in alignment with the direction set by the governance body to achieve the enterprise objectives.

IT Environment

The IT environment is largely dependent on the size of the company and the number of employees and type of computers involved. Historically, a few large computers were operated exclusively by IT personnel. With personal computers, tablets, and phones networked together, it now is not unusual for each employee in a company to use a computer on a daily basis.

- Large companies will have a separate IT department.
- Others will have many IT functions outsourced or partially outsourced and partially performed by end users.
- One characteristic of an IT environment is a reduction in the segregation of duties.

An IT department will normally include systems development and maintenance, operations, and other technical services.

Systems Development and Maintenance

Systems development and maintenance might include the following:

- A **systems analyst** designs the information system using systems flowcharts and other tools and prepares specifications for applications programmers, as well as acting as an intermediary between the users and programmers. Flowcharts are graphical representations of sequences of activities and decisions, and are useful for both documenting systems and procedures and for isolating control weaknesses.
- An **application programmer** writes, tests, and debugs programs that will be used in the system. The programmer also develops instructions for operators to follow when running the programs.
- A **database administrator** is an individual or department responsible for the security and information classification of the shared data stored on a database system. This responsibility includes the design, definition and maintenance of the database.

  Note: The *systems development life cycle* (SDLC) consists of the phases deployed in the development or acquisition of a new software system. SDLC is an approach used to plan, design, develop, test, and implement an application system or a major modification to an application system. Typical phases of the SDLC include the feasibility study, requirements study, requirements definition, detailed design, programming, testing, installation, and post-implementation review.

Operations in an IT Function

Operations might include data control, computer operations, and librarians.

- A **data control clerk** schedules jobs for the computer and manages the distribution of reports and other output. Data control clerks may be involved in coding activities, calculating and checking batch totals, and related clerical tasks.
- The data control department is responsible for collecting data for input into a computer's batch processing operations as well as the dissemination of the finished reports.
- Data entry includes keyboard entry, scanning, and voice recognition. When transactions are entered (batch data entry), they are just stacks of source documents to the keyboard operator. Deciphering poor handwriting from a source document is a judgment call that is often error prone. In online data operations, in which the operator takes information in

person or by phone, there is interaction and involvement with the transaction and less chance for error.

- A **computer operator** is a person who operates a computer in a datacenter and performs such activities as commanding the operating system, mounting disks and tapes, and placing paper in the printer. Operators may also write the job control language (JCL), which schedules the daily work for the computer.
- **Librarians** are the individuals responsible for the safeguarding and maintenance of all program and data files.

Other Technical Services

Other technical services might include telecommunications, systems programming or technical support, and security administration.

- **Telecommunications** is responsible for maintaining and enhancing computer networks and network connections.
- A **systems programmer** or **technical support** is responsible for updating and maintaining the operating systems.
- **Security administration** is responsible for security of the system including control of access and maintenance of user passwords.

Lecture 7.02 – Systems Development Life Cycle (SDLC)

A traditional SDLC approach is made up of a number of distinct phases, each with a defined set of activities and outcomes. Designing and implementing a new information and control system provides an opportunity to reexamine business processes, making them more efficient and effective. When designing an information and control system, the designers should keep in mind the need for sustainability. The system should meet the entity's current needs while keeping in mind needs that may evolve in the future as well as environmental, social, economic, and resource considerations, as well as an evolving environment surrounding the governance of an entity. Generally, there are several SDLC steps:

1. **Feasibility Study**
   Determine the strategic benefits of implementing the system either in productivity gains or in future cost avoidance, identify and quantify the cost savings of a new system, and estimate a payback schedule for costs incurred in implementing the system. Further, intangible factors such as readiness of the business users and maturity of the business processes will also be considered and assessed. This business case provides the justification for proceeding to the next phase.

2. **Requirements Definition**
   Define the problem or need that requires resolution and define the functional and qualitative requirements of the solution system. This can be either a customized approach or vendor-supplied software package, which would entail following a defined and documented acquisition process. In either case, the user needs to be actively involved.

3. **Software Selection and Acquisition** (purchased systems) or **Software Design** (systems developed in-house)
   - **Purchased systems** – Based on the requirements defined, prepare a request for proposal (RFP) from suppliers of purchased systems. In addition to the functionality requirements, there will be operational, support, and technical requirements. These, together with considerations of the suppliers' financial viability and provision for escrow, will be used to select the purchased system that best meets the organization's total requirements (e.g., Salesforce).
   - **Systems developed in-house** – Based on the requirements defined, establish a baseline of system and subsystem specifications that describe the parts of the system, how they interface, and how the system will be implemented using the chosen hardware, software, and network facilities. Generally, the design also includes program and database specifications, and will address any security considerations. Additionally, a formal change control process is established to prevent uncontrolled entry of new requirements into the development process. (Change controls are discussed in more detail in another section.)

4. **Configuration (purchased systems) or Development (systems developed in-house)**
   - ***Purchased systems*** – Configure the system, if it is a packaged system, to tailor it to the organization's requirements. This is best done through the configuration of system control parameters, rather than changing program code. Modern software packages are extremely flexible, making it possible for one package to suit many organizations simply by switching functionality on or off and setting the parameters in tables. There may be a need to build interface programs that will connect the acquired system with existing programs and databases.

- ***Systems developed in-house*** – Use the design specifications to begin programming and formalizing supporting operational processes of the system. Various levels of testing also occur in this phase to verify and validate what has been developed. This would generally include all unit and system testing, as well as several iterations of user acceptance testing. **Scope creep** refers to uncontrolled changes or continuous growth in a project's scope; this can occur when the scope of a project is not properly defined, documented, or controlled.

5. **Final Testing and Implementation**
   Establish the actual operation of the new information system, with the final iteration of user acceptance testing and user sign-off conducted in this phase. The system may also go through a certification and accreditation process to assess the effectiveness of the business application in mitigating risks to an appropriate level and providing management accountability over the effectiveness of the system in meeting its intended objectives and in establishing an appropriate level of internal control. User acceptance testing is considered more important in an object-oriented development process than in a traditional environment because of the implications of the inheritance of properties in hierarchies.

6. **Post-implementation**
   Following successful implementation of a new or highly modified system, implement a formal process that assesses the adequacy of the system and projected cost-benefit or ROI measurements vis-à-vis the feasibility stage findings and deviations. In so doing, Information Systems (IS) project and end-user management can provide lessons learned and/or plans for addressing system deficiencies as well as recommendations for future projects regarding system development and project management processes followed.

7. The **Maintenance Phase** (some interpretations do not include this phase)
   Monitoring and support of the new system, including ongoing training, help desk resources, and a system for making authorized and tested changes to the system.

Agile Project Management

Traditional project management (sequential IT development or waterfall methodology) generally completes each phase of the SDLC before the next is started. This can result in months of effort invested in a system that is a poor match to users' needs.

An agile methodology seeks a more efficient process than waterfall methodology. Scrum is probably the simplest form of agile implementation. Scrum emphasizes empirical feedback, team self-management, and the goal of developing properly tested product increments within short iterations. Whereas traditionally, programmers presented a complete application to users for acceptance testing, agile development is broken into sprints (typically 3-5 weeks, rather than 6-18 months). User stories are developed outlining probable scenarios. These stories form a backlog. The backlog is groomed (stories are refined and ordered based on how essential their function and estimated time to complete). Sprint goals are set at finishing a handful of user stories. As each sprint is finished, results are presented and feedback from users is sought. This feedback is used to further groom the backlog. The Scrum team (typically programmers, developers, and quality assurance specialists) evaluates its performance in the sprint and brainstorms on improvements in process as well as product to improve the results of the next sprint.

Big Data

Big data is information in such high volumes that is difficult for traditional information processing to collect and analyze. It is generated by the large volume of IT processing (social media use, cloud storage, website-tracking data, and ecommerce transactions). Instead of merely storing information for contractual, operational, reporting, and compliance purposes, big data is viewed as an asset that can mined to identify trends, enhance insight, and support decision making.

Data analysis (also called data analytics) is a process of examining, cleaning, organizing, and modeling data with the goal of support decision making.

Data mining is an analysis of data using tools which look for trends or anomalies without advance knowledge of the meaning of the data. It may involve the sorting through data to identify patterns and establish relationships, to bring to light previously unidentified relationships. Some of the parameters include association, sequence or path analysis, classification, clustering and forecasting (predictive analytics).

For example, Big Box, a large-scale retail store, analyzed receipt information to determine a few recurring shopping cart collections. One recurring companion purchase turns out to be beer and disposable baby diapers purchased between 3:30 and 6:30 p.m. Apparently, customers are stopping to purchase these staples on the way home from work. Big Box can use this insight to place products likely to appeal to customers purchasing these items in its stores near or between these staples.

As data mining can be used to address open-ended questions, it is very useful for auditing.

Data integration is the process of combining data from different sources (for example, from industry publications, customer surveys, invoices, etc.) in one collection for analysis.

Data visualization is the process of presenting data in a visual format, typically a diagram, chart, or word cloud. These presentations are limited only by the preparers' imaginations. A word cloud is a visual summary of text data, typically a circle or square of words or short phrases with frequency and importance indicated by size and color.

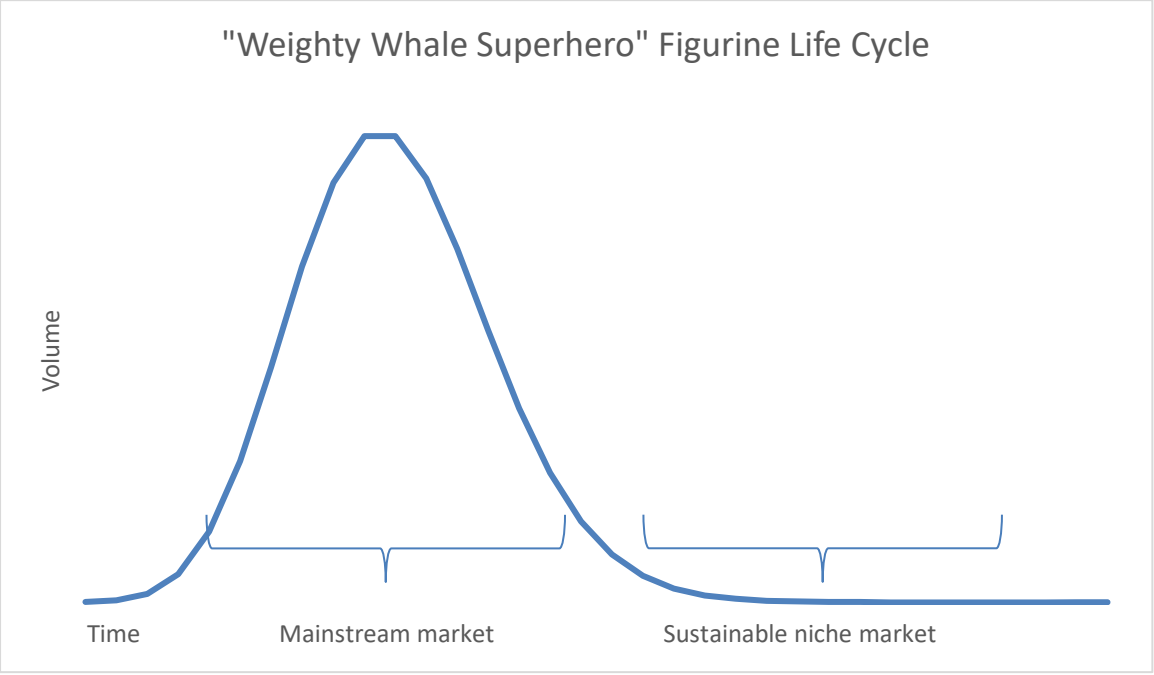
Product Life Cycle Impact

The Internet removes the physical constraints inherent in former economic models, giving rise to new paradigms. The sales cycle of a successful consumer item will grow to a peak. As its popularity declines, its physical shelf space will be assigned to a more popular item. Availability (and, hence, sales) will decrease to zero quickly. On the other hand, if the item is available online, demand will peter into a small, but sustainable, niche market. Conceivably, a small but ongoing demand will result in more cumulative sales over time than that of the initial peak.

In other words, a physical retail environment has limited space; it is logical to replace less popular items with more popular ones. In the physical world, sales would likely end abruptly, as demand for the item moves to the declining, almost-horizontal portion of the life-cycle curve—the tail end. In contrast, an electronic retail environment can hold less popular items indefinitely because warehouse storage space constraints are not a major concern. Also, the global reach of the Internet increases the likelihood that an extended sustainable niche market continues for less popular items. Search engines enable a large audience to find items in the "niche market" portion of the graph. The digital business model allows the tail end of the product life cycle to be long, giving rise to the phenomena of a long tail for product lives. For some products, the units sold in

the long tail can be larger in total than in the mainstream period, especially for electronic products like movies or games.

The "Weighty Whale Superhero" Figurines Life Cycle graph illustrates to how a graph of demand for consumer items (clothing, books, music, videos, memorabilia, etc.) over time shows an upward curve in the introduction period, a large peak for the period when an item is popular, and a period when demand peters out.



For example, Aquatic Adventurers, an animated superhero series, is cancelled after its fifth season. In Fenland—a town of 100,000 people—chances are not good that sufficient customers will purchase the remaining 80 Weighty Whale Superhero figurines that Fenland Toys has in stock at the time the cancellation is announced. A year after the show is cancelled, the chances are even less likely that Fenland Toys will be able to sell these products locally. Without the Internet, a sustainable niche market does not exist for long after the mainstream market subsides; Fenland Toys would dispose of the figurines at a loss to make room for products in high demand. With the Internet, the series' owners (or a movie webcasting network licensed by the owners) can show subscribers the existing episodes indefinitely. Also, Fenland Toys can offer the remaining figurines to billions of people. Even without the webcasting, Fenland Toys will be able to sell figurines to people nostalgic for the original broadcasts. With the webcasting, Fenland Toys will gain customers from people seeing the series online for the first time—conceivably years after the original broadcasts.

Lecture 7.08 – General & Application Controls

General Controls

There are other general controls, in addition to contingency planning. Just as in a manual system, one of the **general controls** in an IT environment involves segregation of the incompatible duties of authorization, recording, and custody:

- **Authorization** - The development of new programs and changes to existing programs should be performed by **systems analysts** and **programmers**. These personnel should not be involved in the supervision of computer operations or the control and review of output. Systems analysts work with operating systems and compilers.
- **Recording** - **Data input clerks** and **computer operators** have the role of entering information into the computer and running the programs. These personnel should not have access to program code that would enable them to modify programs nor should they control the output.
- **Custody** - **Control clerks** and **librarians** obtain and review the output from computers to review exception reports indicating inappropriate functioning of the computer, send printouts and other output to the appropriate destinations, and maintain disks, tapes, or other storage units of data. These personnel should not have the ability to create or alter programs or to operate the computers that generate the information.

Clearly, general controls over **access** to computers and files are of great significance in evaluating internal control in an IT environment. This is particularly important in networks, since the data is distributed widely in such cases. Access to programs and data should require the entry of **passwords** or identification numbers (biometrics), and different levels of password authority should apply so that individuals only gain access to the programs and files that are compatible with their assigned responsibilities. It is also considered good practice to require that individual users change assigned passwords when new accounts are created.

Failure to remove user accounts when an employee leaves a client is a major security risk. An auditor can test these procedures by entering invalid passwords to see that they are rejected and verifying that valid passwords only provide compatible access. The systems access log should also periodically be reviewed to detect computer-related fraud. A **concurrent update control (concurrency control)** helps to address conflicts in a multi-user system, when two people, for example, are trying to purchase tickets at the same time. It will lock the other out, so as not to oversell the tickets.

Limiting access to an entity's computers and the data they hold is becoming an increasingly challenging problem. Measures, referred to as **cybersecurity**, are designed to protect computers against unauthorized access or attack. The National Institute of Standards and Technology (NIST), an agency of the U.S. Department of Commerce, released a framework for improving critical infrastructure cybersecurity.

Documentation of new programs and alterations to existing programs ensures that IT personnel are aware of the availability and proper use of programs and that changes in programming personnel during projects does not interfere with the ability of other employees to understand what has been done previously.

Hardware controls are built into the processing equipment by the manufacturer and provide reasonable assurance that data are not altered or modified as they are transmitted within the

system. Binary computers can only think in terms of **bits** (binary digits) of information that are on or off ("1" or "0"). A series of 8 consecutive bits will produce a **byte** of information that represents a unit of human thought, such as a letter, number, or other character. Hardware controls may include:

- **Parity check -** In the storage of bytes, one bit will be a "dummy" bit that doesn't represent any actual information, but is turned on automatically when necessary so that the total number of bits in the on position is an odd number (in an odd-parity computer). When the computer is reading bytes of data from a chip or disk drive, a byte with an even number of bits turned on will be known to be functioning improperly.
- **Echo check (Echo control) -** When data is being transmitted from one computer to another, especially over telephone lines, distortions caused by static or other causes can cause information to be transmitted improperly. An echo check involves the data sent from one computer to another being transmitted back to the original one, which will verify that it has received what it sent. If the echoed data doesn't agree with the transmission, the packet of data is then resent.

Personal computers (also called microcomputers) present additional control risks since they are small and portable, making them easier to steal or damage. In a microcomputer environment, data and software are also more accessible, and individuals can more readily access unauthorized records and modify, copy, or destroy data and software. Also, individually installed applications make integration difficult in such an environment. A variety of controls can be employed in a microcomputer environment.

- Maintain an inventory listing of all microcomputer equipment and the purposes for which it is used.
- Keyboard locks can be built into the CPUs of microcomputers so that unauthorized users will not have access.
- Microcomputers and monitors can be secured to desks or fixtures to discourage theft.
- Passwords that are changed periodically limit the access of unauthorized users to sensitive data.
- Periodic backup of data on microcomputers enables recovery in the case of alteration or destruction of data.
- Sensitive information can be maintained in offline storage and kept in locked cabinets to prevent unauthorized access.

Application Controls

Application controls are those applied to specific business activities within a computerized processing system to achieve financial reporting objectives. Application controls are specific to each cycle and refer to a client's activities. Application controls relate to data input, data processing, and data output. They are designed to ensure the proper recording of transactions and to prevent or detect errors and fraud for transactions within these cycles. Because application controls are related to specific transactions, audit teams rely extensively on the effectiveness of these controls to mitigate the risk of material misstatement for account balances or classes of transactions. Application controls include:

- **Preventive controls** are designed to prevent errors and fraud.
- **Detective controls** are designed to detect errors and fraud (e.g., reviewing the audit log).
- **Corrective controls** allow individual users to follow up on detected errors and fraud.

Input Controls

Input controls are designed to provide reasonable assurance that data received for processing by the computer department have been properly authorized and accurately entered or converted for processing. These controls also provide the opportunity for entity personnel to correct and resubmit data initially rejected as erroneous. Errors can be avoided through:

- Observational controls
- Use of point-of-sale devices, such as scanners, to gather and record data automatically
- The use of preprinted recording forms can minimize errors.
- Data transcription controls, such as preformatted screens, can minimize errors when converting data to machine-readable form.
- Automated log-off of inactive users is an effective way to prevent unauthorized access to sensitive data. Many banking institutions use these measures.

As data is being entered, it should be subject to various *forms of verification (Logic Tests)*. These might include:

- **Field checks -** Data is validated as to the correct length, character types, and format accepted. For example, an entry of a license plate might be verified for type (alphanumeric, so that only letters and numbers are acceptable) and length (not longer than 7).
- **Validity checks -** Data is compared with a list of acceptable entries to be sure it matches one of them. For example, a field to accept the two-letter state abbreviation will be checked against a file that lists all the acceptable choices, so that an entry of OG for the state will be rejected as invalid.
- **Limit tests -** Numbers are compared to limits that have been set for acceptability. For example, the entry of a pay rate may be compared to the current minimum wage on the lower side and $50 per hour on the upper side to be sure the number entered makes sense. This is sometimes called a reasonableness test, and is the closest computer equivalent to human judgment in reviewing information.
- **Check digits -** Numbers with no obvious meaning, such as identification numbers, are often designed so that one of the digits is determined by a formula applied to the rest of the number. The computer applies the formula when a number is entered to determine if it is an acceptable one. This control makes it difficult for someone to invent a fake number if they do not know the formula, since the program will recognize a number that isn't designed so that the check digit is correct. The check digit can actually be either a number or letter, and can be placed in any consistent position in the overall identification. For example, many states have driver licenses that start with a letter which is derived from a formula applied to the numbers which follow it, and a person trying to create a fictional license will only have a 1 in 26 chance of correctly guessing the letter that should be in the first position based on the numbers.

When using batch processing of data, the data input clerk will often prepare manual **control totals** to be compared with computer-generated totals of entered information in order to ensure accuracy of inputs. These totals include:

- **Record count -** The total number of records entered into the program during a period.
- **Financial total -** The total dollar amount of entries that are financial in nature.
- **Hash total -** The total of values (such as Social Security numbers) which cannot be meaningfully added together, but which serve as a way to verify the correct entry of these values.

For example, assume that the checks written during a particular day are being entered into a checkbook program, and that the data input clerk is working from the following sheet to make the entries:

Check Number	Payee	Amount	Account Code
1001	Philipp Corporation	$ 500.00	307
1002	Rog Enterprises	$3,000.00	602
1003	Ruiz Company	$ 600.00	302
3006		$4,100.00	1211

After the data input clerk enters each of the checks, the computer will then indicate:

Checks Entered = 3 (record count)
Check Number total = 3006 (hash total)
Amount total = $4,100.00 (financial total)
Account Code total = 1211 (hash total)

The data input clerk would have also determined these numbers by computing them from the input sheet, and the agreement of the clerk's totals with those of the program will indicate all lines most likely have been entered correctly.

A program may also perform **edit checks** on batch-processed data to verify that each individual entry is appropriate, and generate a list of rejected transactions for review by the control clerk.

Processing Controls

Once data is input, processing controls are designed to provide reasonable assurance that data processing has been performed accurately without any omission or duplicate processing of transactions. Many processing controls are similar in nature to input controls, but they are used in the processing phases, rather than at the time input is verified. The most fundamental processing control a client can implement is periodically testing and evaluating the processing accuracy of its programs.

- Systems and software documentation allows system analysts to verify that processing programs are complete and thorough.
- Computer programs can be tested using error testing compilers to ensure that they do not contain programming language errors.
- Test data exposes the program to one sample of each type of exception condition likely to occur during its use.
- System testing can be used to make certain that programs within the system are interacting properly.

Output Controls

Output controls represent the final check on the results of computerized processing. Output controls are concerned with detecting errors rather than preventing errors. These controls should be designed to provide reasonable assurance that only authorized persons receive output or have access to files produced by the system.

Auditing Issues

Although the existence of an electronic system does not change the basic objectives of an audit engagement, it has a major impact on the approach used to achieve those objectives.

Computer software cannot replace the judgment of the auditor. The responsibility for determining the acceptable level of audit risk and assessing the component risks remains with the auditor.

Differences

AU-C 315 summarizes the **differences** as follows:

- **Benefits of IT**
    - Consistency – Computers process data the same way every time.
    - Timeliness – Electronic processing and updating is normally more efficient.
    - Analysis – Data can be accessed for analytical procedures more conveniently (with proper software).
    - Monitoring – Electronic controls can be monitored by the computer system itself.
    - Circumvention – Controls are difficult to circumvent when programmed properly, and exceptions are unlikely to be permitted.
    - Segregation of duties – Security controls can prevent the performance of incompatible functions by the same individual or group through security controls in applications, databases, and operating systems.

- **Risks of IT**
    - Overreliance – Without clear output, IT systems are often assumed to be working when they are not.
    - Access – Disclosure, destruction and alteration of large amounts of data are possible if unauthorized access occurs.
    - Changes in programs – Severe consequences without detection are possible if unauthorized program changes occur.
    - Failure to change – Programs or systems are sometimes not updated for new laws, rules, or activities.
    - Manual intervention – Knowledgeable individuals can sometimes alter files by bypassing the appropriate programs.
    - Loss of data – Catastrophic data loss is possible if appropriate controls aren't in place.

Risks

There are **two risks** of major concern to the auditor:

- **Unauthorized access** to a computer system can cause more damage to the accounting system as a whole than in a manual system where it is difficult for one person to access all the different records of the system.
- The **audit trail** is an electronically visible trail of evidence enabling one to trace information contained in statements or reports back to the original input source.

  An **audit trail** is also important to the client for the proper functioning of the system during the year, since such a trail allows monitoring of activities, providing a deterrent to fraud and making it possible to answer queries by examining the source data. The auditor should establish the reliability and extent of the audit trail.

Audit Efficiency

When examining a company in an IT environment, the auditor may decide to use a **generalized audit software package**. This refers to a series of programs that can be used for general processes, such as record selection, matching, recalculation and reporting and might include:

- Programs to **access client files** for purposes of testing. For example, the auditor's program may access computerized inventory files to determine the location of inventory,

perform analytical procedures (such as calculating inventory turnover), or review dates of last purchase and sale in order to identify obsolete or slow-moving inventory.

- **Source code comparison** programs that can detect unauthorized changes made by the client in programs that the auditor is testing. For example, after the auditor has verified the proper functioning of a copy of the payroll program provided to them by the client for testing, this program would compare the tested program with the one being used by the client to process an actual payroll period to be sure the files are identical.
- Programs that duplicate common functions of client software that can be used to perform **parallel simulation**, in which the auditor inputs client data to the auditor's program (created by the auditor) to see if it produces the same results as the client's program. For example, the auditor might obtain the raw data for an actual payroll period and run it through a payroll program included in the generalized audit software package to see if the checks and payroll records produced are identical to the checks and records generated by the client's program.
- Programs to produce **spreadsheets** for working trial balances and similar audit needs.

When the client has a program that the auditor wishes to verify and for which there is no appropriate equivalent program available to the auditor, techniques involving the direct use of the client program are necessary. One approach is known as the **test data** approach, in which the auditor will develop simulated transactions to enter into the client's program. Characteristics of this approach include:

- The auditor can include both valid and invalid transactions to verify that the program processes appropriate data correctly and rejects inappropriate transactions.
- The auditor only needs to design simulated transactions for those **valid and invalid conditions** that interest the auditor.
- Only **one example** of each valid and invalid condition needs to be included (since computer programs are consistent in the way they handle items), making this an efficient method of testing.

The auditor should obtain audit evidence about the accuracy and completeness of information produced by the entity's information system when that information is used in performing audit procedures. The primary **advantage** of IT as it relates to an audit is that a computer is not subject to **random errors** as is a human. Thus, an auditor who has **verified** that a computer program is working properly will **not** have to **test individual transactions** to be sure the computer is following directions consistently: it will always follow its program. An audit of a computerized system can, therefore, rely more heavily on internal control structure and reduce the need for substantive testing, making the audit potentially more efficient.

It is possible to create **embedded audit modules** in the DBMS so that information wanted by an auditor during annual engagements can be easily accessed. One difficulty in this idea is that these modules should be included in the design of the system itself, forcing the outside auditor to be involved in consulting on the design, and may impair the auditor's independence.

One danger is that the client may provide the auditor with a program to verify which isn't the actual program used by the client. To avoid this, the auditor will often include the **test data** in an **integrated test facility**, including the simulated data (fictitious transactions) along with actual data during a program run. For example, the auditor may add simulated payroll data to the actual data for a pay period, so that the testing occurs at the same time the actual employee information is being processed (of course, the simulated data is specially coded so as not to be permanently mixed with the real data).

If it isn't practical to use an integrated test facility, the auditor may use an approach known as **controlled reprocessing,** in which the auditor supervises the entry of actual client data into the client program to reproduce the results of a previous run of the program by the client. After verifying that the results are identical to the previous run, the auditor knows that the program is the actual one used, and can enter the test data into it at a separate time.

To summarize the techniques available:

	Data	**Program**
Test Data (Phony Data) – theoretically only have to check one above and one below credit limit.	Auditor	Client's
Controlled reprocessing	Client's	Client's (but Auditor's computer)
Integrated Test Facility (ITF) (Dummy division or file & fictitious transactions)	Auditor & Client's	Client's
Transaction Tagging	Client's information with a tag	Client's
Parallel Simulation	Client's	Auditor's (Going around their system)

	Actual Client Data	**Simulated Data**
Actual Client Program	Controlled Reprocessing	Test Data (Integrated Test Facility)
Program Purchased Separately by Auditor	Parallel Simulation	No Relevance to Audit of Client

Trust Services

Trust Services are governed by SSAE (Statements on Standards for Attestation engagements) and represent attest engagements in which a CPA assesses a client's commercial internet site and reports on whether the system meets one or more of the following **principles:** Security; Availability for operation; Processing integrity; Online privacy; and Confidentiality. For each Principle reported, the auditor considers each of the following **4 criteria:** Policies; Communications; Procedures; and Monitoring.

Both WebTrust and SysTrust are designed to incorporate a seal management process by which a seal (logo) may be included on a client's website as an electronic representation of the practitioner's unqualified WebTrust report. If the client wishes to use the seal (logo), the engagement must be updated at least annually. Also, the initial reporting period must include at least two months. Any of the 5 types of opinions may be issued as discussed in the audit report section.

- **Websites (WebTrust)** – An assurance function designed to reduce the concerns of Internet users regarding the existence of a company and the reliability of key business information placed on its website.
- **Information systems (SysTrust service)** – An assurance function that reviews an entity's computer system to provide confidence to business partners and customers concerning the security, privacy, and confidentiality of information in addition to system availability and processing integrity.

System and Organization Controls (SOC) Reports

Service organizations are entities that provide services—such as payroll or web-hosting—to other entities. SOC for Service Organizations reports are issued by an independent CPA to assist service organizations in building trust and confidence in the service provided and controls related to those services. There are three types of such services.

SOC 1® – SOC for Service Organization: ICFR

Report on Controls at a Service Organization Relevant to User Entities' Internal Control over Financial Reporting

Reports prepared in accordance with AT-C 320, *Reporting on an Examination of Controls at a Service Organization Relevant to User Entities' Internal Control Over Financial Reporting*, are intended to meet the needs of user entities and user auditors in considering the controls at the service organization and their impact on the user entities' financial statements. *User entities* are entities that use the service organizations' services. *User auditors* are the auditors of user entities. Use of these reports is **restricted** to the management of the service organization, user entities, and user auditors. There are two types of reports for ICFR engagements:

- Type 1 – Report on the fairness of the presentation of management's **description** of the service organization's system and the **suitability of the design of the controls** to achieve the related control objectives included in the description as of a specified date.
- Type 2 - Report on the fairness of the presentation of management's **description** of the service organization's system and the **suitability of the design and operating effectiveness of the controls** to achieve the related control objectives included in the description throughout a specified period.

SOC 2® – SOC for Service Organizations: Trust Services Criteria

Report on Controls at a Service Organization Relevant to Security, Availability, Processing Integrity, Confidentiality or Privacy

These reports are designed to meet the needs of users that seek **detailed** information and assurance about the controls at a service organization relevant to security, availability, and processing integrity of the systems the service organization uses to process users' data and the confidentiality and privacy of the information processed by these systems. The emphasis within SOC 2 reports is not on ICRF, but the operational fitness of the system. These reports can play an important role in:

- Oversight of the organization
- Vendor management programs
- Internal corporate governance and risk management processes
- Regulatory oversight

Similar to a SOC 1 report, there are two types of reports, with similar differences: A type 1 report is on management's **description** of a service organization's system and **the suitability of the design of controls**. A type 2 report is on management's description of a service organization's system and **the suitability of the design and operating effectiveness of controls**. Use of these reports are **restricted**.

SOC 3® – SOC for Service Organizations: Trust Services Criteria for General Use Report

These reports are intended to meet the needs of users who seek assurance about the controls at a service organization relevant to security, availability, processing integrity confidentiality, or privacy, but do not seek or have the knowledge required to make effective use of the detail in a SOC 2 Report. Since SOC 3 reports are **general-use reports**, they can be freely distributed. The most common examples of a SOC 3 report are WebTrust and SysTrust.

Lecture 7.10 – Glossary – Transaction Processing

Acquaintance with these terms is necessary to understand exam IT questions sufficiently well to answer them correctly, although most of this information is tested directly on the AICPA exam only infrequently.

Artificial Intelligence

Artificial intelligence is computer learning, planning, and solving problems, when the computer perceives its environment and executes actions designed to reach a goal. It generally includes competing at strategic games (such as chess), understanding human speech, and complex tasks (such as driving a car). Machine learning involves algorithms that can learn from data and make predictions on data in a reiterative fashion.

Transaction Processing

The processing of transactions can take place in one of two general ways:

- **Online Transaction Processing (OLTP), online real-time (OLRT) processing**
- **Batch processing**

OLTP means that the database is updated as soon as a transaction is received (**immediately**). Online transaction processing keeps business records up-to-date the moment transactions are keyed or transmitted into a system. This produces records that are as up-to-date as possible, but poses a problem of requiring that computers be continually running and accessible at all points-of-transaction. This is a good method to be used by retail businesses. With the common presence of computers, this has become the default processing method for most business activity.

Batch processing involves gathering information and then entering transactions in a group (usually dollar fields) to the computer periodically. This allows for greater control over the input process, including more possibility for verifying data entry with control totals and authorization before input. The major difficulty is associated with the **delay** between the transactions and the input, which can result in accounting records not accurately reflecting the current situation.

As an example of the choice between the two approaches, a bank is going to use OLTP for the processing of cash withdrawals, since it is critical that these be immediately reflected in the depositor's balance and errors can be easily reversed later with little harm to the bank. On the other hand, a bank would prefer to use batch processing for deposits to be sure that increases in depositors" balances are authorized and checked carefully for accuracy before accounts are updated. Unauthorized postings of deposits could allow a depositor to withdraw large sums of money and delays in posting would be of little negative consequence to the bank itself. As a practical matter, batch processing tends to be used for large (such as bank deposits over $5,000) or sporadic (such as payroll preparation) transactions.

Networks

In the early days of computers, each device was so expensive that a company rarely had more than one and all activity had to take place on that single computer. Although different people could connect to that single computer using **remote terminals**, these were simply input and output devices (essentially equivalent to just the keyboard and monitor on a current desktop). All activity had to take place on the one computer, known as **centralized processing**. Today, computers are

so reasonably priced that, in many businesses, employees each are assigned their own computers (whether a laptop, tablet, or smartphone). This allows the allocation of a large volume of computer tasks to different employees and computers at different locations, known as **distributed processing**. Since the data utilized by the company is no longer on a single computer, it is necessary for them to be able to connect to each other in some way to form a **network.**

In a computer network, computers are connected to one another to enable sharing of peripheral devices, sharing data, and programs stored on a **file server.** A file server is a high capacity disk storage device or a computer that stores data centrally for network users and manages access to that data. File servers can be dedicated so that no process other than network management can be executed on that server while the network is available. Non-dedicated file servers allow the standard user applications to run while the network is available.

Networks allow various user departments to share information files maintained in **databases**. Databases should:

- Provide departments with information that is appropriate
- Prevent access to inappropriate information

Network configurations allow the linking of computers in different ways:

- **Local area networks (LANs)** Communications networks that serve several users within a specified geographical area. A personal computer LAN functions as distributed processing in which each computer in the network does its own processing and manages some of its data. Shared data are stored in a file server that acts as a remote disk drive for all users in the network. Good management controls, such as access codes and passwords, are essential.
- **Wide area networks (WANs)** Computer networks connecting different remote locations that may range from short distances, such as a floor or building, to extremely long transmissions that encompass a large region or several countries.
- **Value-added network (VAN)** – Links computer files of different companies together. As a result, it is necessary to have increased security for data transmissions to make certain that others will not have access to inappropriate entity information.
- **Virtual Private Network (VPN)** – Allows users to access network resources from remote locations; may or may not be incorporated as part of a larger cloud computing strategy.

The need for solid physical transmission media in LANs has been overcome through the development of **wireless local area networks (WLANs).** Short-range radio transmission allows different computers to communicate with each other and share printers, Internet connections, and other devices. The two prominent standards for WLANs are **Wi-Fi** (also known as 802.11) and **Bluetooth**. Any devices that are in the vicinity of each other and which follow the same standard can communicate. In addition to computers, cell phones and personal digital assistants (PDAs) are often equipped to use one or both standards.

Clearly, unauthorized access is a major danger with WLANs and both **encryption of data** and **passwords** (a technical security control) to connect to the system are critical security needs to prevent others with wireless devices from accessing the system. On the other side, businesses such as hotels and restaurants have sometimes installed Wi-Fi connections for the benefit of guests and patrons to allow them high-speed Internet access (sometimes requiring logging into a network at a fee and sometimes at no charge to encourage visitors).

Networking would get very complicated if every computer in a network had to be able to directly connect to every other computer in the network (in order for 10 different computers in an office to be connected this way in a LAN, there would have to be 45 different cables!). Even in the case of a wireless network, a computer would have to be able to distinguish all the different signals coming from different computers.

Topology refers to the shape of a network, or the network's layout. How different nodes in a network are connected to each other and how they communicate are determined by the network's topology. To simplify the process, the communication is normally organized (and can be visualized) in one of the following ways:

- **Bus** – A common path or channel between hardware devices, which can be located between components internal to a computer or between external computers in a communications network.
- **Star –** There is one computer (central hub) to which all other computers connect, so that all data is first received and then sent from that one computer (in email systems, this will allow copies of all messages to be stored on a single computer while still allowing communication among all of the others).
- **Ring –** Each computer is connected to its two closest neighbors in a closed loop, and information is transferred through each intermediate computer to get to the intended destination (notice there will be two directions that can be used, so an interruption of a single connection won't bring down the network).
- **Tree –** Groups of star-configured networks are organized in branches with one computer at the base, so that computers that are on the same branch can connect to each other without going through the root computer, but computers on different branches may have to go through the root computer.
- **Mesh** - Devices are connected with many redundant interconnections between network nodes. In a pure mesh topology, every node has a connection to every other node in the network.

Networks may involve any size group from two (as in the case of many home networks) to the entire world (in the case of the Internet).

An **Intranet** is a network that is limited to the computers of a single company.

An **Extranet** is similar to an Intranet, since it is primarily for users within a single company, but select customers and vendors are able to participate as well.

The **Internet** is a worldwide network that allows virtually any computer system to link to it by way of an electronic gateway. The Internet facilitates data communication services including:

- Remote login
- File transfer
- Electronic mail (Email)
- Newsgroups

The networking of different computers allows more than just the transfer of information from one to another. It also allows one computer to be used to operate the other. In **client/server computing**, the users of **client** computers will be able to access a **server** computer and can be given the ability to add, edit, or delete data on the server, or even to operate programs running on the server as well as transfer files between their client and the server. The physical device used by

an employee to access these resources, usually a computer, also is called a **workstation**. The server doesn't, in effect, have any particular user since it is being operated by the users on the client computers, and a server computer doesn't even need a display monitor or keyboard, except for initial set up. **Virtualization** is a method used to create multiple virtual machines for clients to access on a single physical server.

The development of the Internet has also created many opportunities and challenges when it comes to the use and protection of information. One example is the emergence of **mobile computing**. This allows individuals to use various devices to obtain access to data and information from whatever location they are at. Another is the rapidly spreading influence of **social media**. Social media enables individuals to create, share, and exchange information and ideas in virtual communities and networks. Social media has proven an effective tool for:

- Market research
- Communication
- Sales promotions
- Relationship development (match.com)
- E-commerce

Cloud computing is a model that allows organizations to use the Internet to access and use services and applications that run on remote third-party technology infrastructure, rather than rely on in-house platform solutions (e.g., Spotify, Youtube, our online course). Cloud computing is the integration of virtual machines, remote services for hardware and software, and Web access. Working in the cloud can mean simply using remote server for data storage or using a browser to access Web-based applications. Because cloud computing utilizes third-party hardware and software, it usually has lower upfront costs for equipment and maintenance. Cloud computing is generally not the best way to secure sensitive corporate information, as there are security risks to transmitting information over the Internet. Common implementations of cloud computing involve off-the-shelf software that is not developed or modified in-house, with generally limited configuration and program modification options.

Collaborative computing allows users to connect, communicate and work on projects and documents together in real time. Examples include instant messaging (google chat), video conferencing, multicasting, email applications, groupware systems, just to name a few.

Gamification refers to applying game elements and digital game design techniques to solving problems and making decisions that are not generally associated with games. This may include business problems or challenges related to social impact.

Geolocation is information about your physical, real-world location that can be associated with. an IP or MAC address. This information can be used by applications to show how nearby your friends or employees are, get directions to a restaurant or customer, or to **geotag** your photos.

World Wide Web To make use of the Internet more user-friendly, a framework for accessing documents was developed known as the World Wide Web.

- *Hypertext Transfer Protocol (HTTP)* – The language commonly understood by different computers to communicate via the Internet.
    - *Transmission Control Protocol and Internet Protocol (TCP/IP)* – an IP is a unique computer address and a TCP/IP is a communications protocol designed to network dissimilar systems, such as viewing a webpage.
- *Document* – A single file on any computer that is accessible through the Internet.
- *Page* – The display that results from connection to a particular Internet document.

- *Uniform Resource Locator (URL)* – The "address" of a particular page on the Internet.
- *Web Browser* – A program that allows a computer with a particular form of operating software to access the Internet and which translates documents for proper display.
- *Server* – The computer that is "sending" the pages for display on another computer.
- *Client* – The computer that is "receiving" the pages and seeing the display.
- *Upload* – Sending information from a client to a server computer.
- *Download* – Sending information from a server to a client computer.
- *HTML (HyperText Markup Language)* and *XML (Extensible Markup Language)* are specialized programming languages used to create websites.

Networks and Control Risk

To minimize control risk, a network should have some form of security that limits access to certain files to authorized individuals.

- Certain individuals may have *read only* access to files.
- Others will be authorized to alter the data in the files, such as *read/write*.

A **virus** is a program with the ability to reproduce by modifying other programs to include a copy of itself. A virus may contain destructive code that can move into multiple programs, data files or devices on a system and spread through multiple systems in a network. A **Trojan horse** is a purposefully hidden malicious or damaging code within an authorized computer program. Unlike viruses, they do not replicate themselves, but they can be just as destructive to a single computer.

- A **worm** is a program that duplicates itself over a network so as to infect many computers with viruses.
- A **hoax virus** is a widely distributed email message warning of a virus that doesn't exist.
- A **killer application** simply refers to a program that is extremely useful, and is not anything dangerous.
- **Phishing** (brand spoofing or carding) is the act of sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

Ransomware is an unauthorized program used by cybercriminals to extort money that restricts access to data until a ransom is paid and a digital key is entered.

Antivirus software is a software application deployed at multiple points in an IT architecture. It is designed to detect and potentially eliminate virus code before damage is done and repair or quarantine files that have already been infected.

Unauthorized downloads of "pirated" software from the Internet can also create risks of lawsuits and criminal prosecutions (e.g., movies, programs and music).

A tool for establishing security is a **firewall**, which prevents unauthorized users from accessing data. A firewall can be in the form of a computer program (software) or a physical device that blocks the transmission media being used (hardware). A **network firewall** is designed to prevent unauthorized access to the company computers, while **application firewalls** protect individual programs. Network firewalls are easier and cheaper to implement, but if penetrated, leave the computers at severe risk. Application firewalls need to be installed for each individual program the company wishes to protect, but allow additional user authentication procedures to protect the program and data and make access more difficult.

Lecture 7.11 – Glossary – Hardware & Software

Hardware

Hardware is the physical electronic equipment. Common components include:

- **Central Processing Unit** or **CPU** – The principal hardware component that processes programs.
- **Memory** – The internal storage space or **online storage**, often referred to as **random access memory** or **RAM.**
- **Primary Storage** – Computer memory which is used to store programs that must be accessed immediately by the CPU.
- **Offline Storage** –Devices used to store data or programs externally, including magnetic tape, flash drives, thumb (usb) drives, digital video disks (DVDs), and compact disks (CDs).
- **File Server** – A high capacity disk storage device or a computer that stores data centrally for network users and manages access to that data. File servers can be dedicated so that no process other than network management can be executed while the network is available. File servers can also be non-dedicated so that standard user applications can run while the network is available.
- **Input and Output Devices** – Devices that allow for communication between the computer and users, such as a terminal with a screen and a keyboard, scanners, microphones, wireless hand-held units, barcode readers, point-of-sale registers, optical character readers, mark sense readers, light guns, printers, speakers, floppy disk drives, CD and DVD drives, magnetic tape drives, and magnetic disk drives.
- **Router** – A specialized device that receives data packets from one computer and sends it toward its destination in the most efficient manner possible. The Internet, in fact, primarily consists of a series of routers used to transmit information among all the different computers of the world that are connected to the Internet at any one time. When a computer in California connects to a website in Australia, the two computers aren't actually connected to each other, and there might be 10 computers between them acting as intermediary routers. When parts of the Internet go down, due to a power outage or other difficulty, most people never notice because the routers find another way (route) to get the information to its destination.
- **Gateway** – This is a device (router, firewall) on a network that serves as an entrance to another network. In order for a home or business to connect to the Internet, for example, it must connect to a gateway computer at their Internet Service Provider (ISP), which is the first router in the process of connecting to the rest of the Internet.

Storage Devices

Magnetic tape – Inexpensive form of storage used primarily for backup, since only **sequential** access to data is possible.

Magnetic disks – Permanent storage devices inside a computer (including hard drives) that allow **random** access to data without the need to move forward or backward through all intervening data. Some systems use **RAID** (redundant array of independent disks), which includes multiple disks in one system so that data can be stored redundantly and the failure of one of the disks won't cause the loss of any data.

Transportable forms of storage - In increasing order of capacity, these include:

- Floppy disks
- Zip disks
- Compact disks (CDs)
- Optical disks (DVDs)
- Thumb drives

Input (Data-entry) and Output Devices

- Visual display terminal (keyboard and monitor)
- Mouse (including stylus, mousepad, joystick, and light pen)
- Touch-sensitive screen
- Magnetic tape reader
- Magnetic ink character reader
- Scanner
- Automatic teller machine
- Radio frequency data communication
- Point-of-sale recorder
- Voice/retina recognition
- Electronic data interchange
- Barcode readers

Software

Software consists of programs and supporting documentation that enable and facilitate use of the computer. Software controls the operation of the hardware and the processing of data. Software is either system software or application software.

- **System software** is made up of the programs that run the system and direct its operations, comprised of the operating system and utility programs. **An operating system (OS)** is a set of system software programs in a computer that regulate the ways application software programs use the computer hardware and the ways that users control the computer. Examples of commonly used operating systems are Windows and UNIX. Such programs may be designed to allow functions such as:
    - **Multiprocessing –** The simultaneous operation of multiple programs on a single computer.
    - **Windowing –** The ability to display the output of different programs on the monitor or portions of the monitor at the same time, as well as easily switch the display from one program to another (whichever program is set to accept and process the next click of the mouse or keyboard is known as the active window).
- **Application software** is designed to perform specific tasks for the company.
- **Utility** programs are used for sorts, merges, and other routine functions to maintain and improve the efficiency of a computer system. Specialized **security software** is a type of utility program used to control access to the computer or its files.
- **Library** programs are limited programs used by other programs, such as a random number generator.
- **A query program** is an application that counts, sums and retrieves items from a database based on user criteria.
- **Algorithms** are instruction sets used in programs to define and control processes.

- **Communication software** handles transmission of data between different computers.
- **Protocol –** Rules determining the required format and methods for transmission of data.
- **Heuristic** refers to software that can learn and modify its operations, such as a spell-checking program that can accept new words in its dictionary.
- Almost all commercially marketed software is copyrighted, but not necessarily copy-protected.
- **Open source** is a software development model with free access to programs created and supported by developers and users. The program source code is freely available to download, modify, and adapt to meet specific needs. The growing use of powerful collaborative and networking tools (social networks, blogs, news feeds and aggregators, podcasts, and collaborative content management) fuels the development of open source software.

Programming Languages

- **Source program** is in the language written by the programmer (high level languages resemble English while assembly languages are close to direct machine instructions).
- **Object program** is in a form the machine understands (on-off or 1-0).
- **Compiler** is a program that converts source programs into machine language.
- **Fourth Generation Programming Languages (4GL)** are commonly used in the development of business applications, and are distinguished by their use of "natural language" commands, making them self-documenting.
- **2 popular programming languages**
    - **C++** (pronounced "see plus plus") is a general-purpose programming language with high-level and low-level capabilities. It is a statically typed, free-form, multi-paradigm, usually compiled language supporting procedural programming, data abstraction, object-oriented programming, and generic programming.
    - **Java** is a programming language originally developed by Sun Microsystems and released in 1995. Java applications are typically compiled to bytecode, although compilation to native machine code is also possible. At runtime, bytecode is usually either interpreted or compiled to native code for execution, although direct hardware execution of bytecode by a Java processor is also possible.
        - Java derives much of its syntax from C and C++ but has a simpler object model and fewer low-level facilities. **JavaScript**, a scripting language, shares a similar name and has similar syntax, but is not directly related to Java.
- **HTML** (HyperText Markup Language) and **XML** (Extensible Markup Language) are specialized programming languages used to create websites.
- **eXtensible Business Reporting Language (XBRL)** is an open, market driven computer language that allows for the free electronic exchange of business and financial data. Instead of treating financial information as a block of text (e.g., standard Internet page or Word document), it provides a computer-readable identifying tag for each individual item of data. For example, "net income" has its own unique tag and a computer could immediately generate a comparison of net income for multiple companies or periods. XBRL eliminates the costly process of manual data comparison as computers can select,

analyze, store, and exchange data in XBRL documents. Another benefit to XBRL is that it reduces the chance of errors when generating reports.

- XBRL can handle data in different languages and accounting standards.
- XBRL is built upon XML (Extensible Mark-up Language).
- The SEC **mandated** that all public companies file financial statements in XBRL.
- Her Majesty's Revenue and Customs (HMRC), the department of the British Government responsible for the collection of taxes, mandated all corporations' tax submissions use iXBRL ("inline" XBRL).

Data Structure

Data structure refers to the relationships among files in a database and among data items within each file. Since computers do not actually think and visualize, but are simply electronic machines, the storage of data is in the form of switches. Switches are typically associated as a data link layer device. They enable local area network (LAN) segments to be created and interconnected, which also has the added benefit of reducing the collision of domains in Ethernet-based networks. The term **binary** refers to the fact that the switches have only two possible positions. Binary computers can only think in terms of **bits** (binary digits) of information that are *on or off ("1" or "0"*). A series of 8 consecutive bits will produce a **byte** of information that represents a unit of human thought such as a letter, number, or other character. The manner in which data is described includes the following terms:

- ***Bit*** – A single switch in a computer that is either in the on (1) or off (0) position
- ***Byte*** – A group of 8 bits representing a character.
- ***Character*** – A letter, number, punctuation mark, or special character.
- ***Alphanumeric*** – A character that is either a letter or number.
- ***Field*** – A group of related characters representing a unit of information (such as a phone number or a city name).
- ***Record*** – A collection of related information treated as a unit. Separate fields within the record are used for processing the information (such as the name, address, and telephone number of one employee).
  - Primary key – The field in a record that can be used to uniquely identify that record (such as the social security number field for an employee). It must be a field that has a value for every record, and is never the same in two different records (a name would not be a good idea as a primary key, since two people might have the same name).
  - Secondary key – A key that might be able to uniquely locate a record when the primary key is unknown (the employee name, in this example, typically would to find a unique record, but isn't guaranteed to do so as the social security number would be).
- ***File*** – A group of logically related records (such as the contact info for all the employees).
  - Master file – A permanent source that is used as an ongoing reference and that is periodically updated.
  - Detail file – A file listing a group of transactions which may be used to update a master file. This is also frequently called a transaction file.
- ***Database*** – A stored collection of related data needed by organizations and individuals to meet their information processing and retrieval requirements (such as a payroll database

that might have a file for contact info, a file with rate and withholding information, a file indicating hours worked, etc.).

- ***Table*** - A set of data elements (values) that is organized using a model of vertical columns (which are identified by their name) and horizontal rows. A table has a specified number of columns, but can have any number of rows. Users making database queries (a common audit technique) often need to combine several tables to get the desired information.
- ***Data definition file*** – A file that describes the logical structure of a database, including the titles and descriptions of the fields stored in each file and the relationships that exist between the data in the different files (for instance, indicating that the employee ID field in the file of hours worked is linked to one specific record in the contact info file which will have that same employee ID field). The data definition file should be included along with all the other files in the database to allow programs to read and understand all the files in the database.

A **database management system (DBMS)** is a software system that controls the organization, storage and retrieval of data in a database. The DBMS consists of a program and accompanying database that is used to keep track of information in an organized and efficient manner.

The program and database should be independent of one another, so that the database could be accessed by another user without needing the same program. One reason for this is that the database may be stored on a single file server (such as a website), while different users can use the database from their own client computer. Another reason is that the company may want to limit the access of some users to specific parts of the database, or allow some users to only read and not change data. This also might be done with a program that sets different access levels based on passwords, connection method, or other means. Yet a third reason is that the program maintenance can be performed more readily.

Data normalization is the process of organizing a database for minimum redundancy. While the details of DBMS design are too complicated to expect exam testing, it should be noted that an important goal of the DBMS should be to minimize the repetition and redundancy in the database, both to enhance efficiency and remove the danger of information being stored inconsistently in different places.

For example, the name and address of each employee is stored only in the contact info file and not included with the rate file or the hours worked file (the last two include the employee ID, but not the name). This way, only one file is updated when an employee changes his or her name or address. It is easy to generate reports (such as paychecks) by taking information from the three different files and grouping them together with the necessary computations.

Lecture 8.01 – BEC Final Review

YOU FINISHED YOUR BEC COURSE…NOW WHAT?

A quick guide to the final days leading up to, and following, the exam

I. FINAL REVIEW

Now is the time to make connections and solidify your understanding of the topics you found most challenging, and to review the most heavily tested topics on the exam.

- ❑ Reread your course notes and review bookmarked lectures.
- ❑ Review your Course Overview page in the Interactive Practice Questions (IPQ) software. Make sure to go through any unanswered questions and review any questions you have answered incorrectly or bookmarked for final review.
- ❑ A great way gear up for the upcoming exam is by adding a Roger CPA Review Cram Courses to your studies. The Cram Course works very well as a final review, as it is designed to reinforce your understanding of the most heavily tested CPA Exam topics.
- ❑ Take at least one full practice exam using the CPA Exam Simulator in your IPQ. This will help you hone your test taking strategy, time management and self-discipline under exam-like conditions, while continuing to expose you to the material.

II. DAY OF THE EXAM

- ❑ Get a good night's rest before heading into your exam.
- ❑ Arrive to the Prometric testing center at least 60 minutes before your appointment so you have time to park, check-in, and use the restroom before your exam begins.
- ❑ Bring your Notice to Schedule (NTS) and two forms of acceptable identification (see Intro for more details).
- ❑ Proceed through check-in: store belongings, get fingerprinted, have photo taken, sign log book, get seated, write your Launch Code (from your NTS) on your noteboard.
- ❑ Don't stress. You've prepared for this; now, just breathe and power through!

III. DURING THE EXAM

- ❑ Remember your BEC Exam time strategy, and jot down the times at which you want to be at your benchmarks:
    - Allocate 75 seconds per multiple choice question
    - Allocate 10 - 15 minutes for each written communication question
    - Allocate 15-25 minutes for each task-based simulation, depending on complexity
    - Take the standard 15-minute break after the 3rd testlet – it does not count against your time
    - (Remember that any other break will count against your time)

BEC: 4 Hour Exam					
Testlet 1	**Testlet 2**	**Testlet 3**	**Break**	**Testlet 4**	**Testlet 5**
31 MCQs	**31 MCQs**	**2 TBSs**		**2 TBSs**	**3 WCs**
45 min	**45 min**	**50 min**		**50 min**	**50 min**

- ❑ You will be given 10 minutes to review the welcome screens and exam instructions. You should already be familiar with these screens after taking the AICPA Sample Test, and can bypass them during your exam.
- ❑ Once you begin testing, make sure to read each question carefully, paying close attention to the keywords that dictate the question's intention (e.g. *except, is greater than*).
- ❑ Take note if your questions are getting more difficult. That's a good sign! A progressively harder exam indicates that you are performing well.

IV. AFTER THE EXAM

- ❑ Remember, it is normal to not feel great after you're done with your exam. It's a tough exam and designed to challenge your confidence and competencies.
- ❑ Relax and celebrate! You've earned it.
- ❑ Your scores will be released within a couple of weeks (see Intro for table).
- ❑ GOOD LUCK!!!

Document Review Simulations (DRS) Appendix

Lecture 9.01 – DRS Introduction – Part 1

Lecture 9.02 – DRS Introduction – Part 2

Document review Simulations Overview

In 2016, the CPA Exam introduced a new type of Task-based simulation known as Document Review Simulations (DRS). These problems were added to the AUD, FAR and REG exams in 2016, and were added to the BEC exam in conjunction with the CPA Exam changes effective April 1, 2017.

What is a DRS?

DRS are designed to simulate tasks that the candidate will be required to perform as a newly licensed CPA (based on up to two years' experience as a CPA). Each DRS presents a document that has a series of highlighted phrases or sentences that the candidate will need to determine are correct or incorrect. To help make these conclusions, numerous supporting documents, or resources, such as legal letters, phone transcripts, financial statements, trial balances and authoritative literature will be included. The candidate will need to sort through these documents to determine what is, and what is not, important to solving the problem.

A DRS is one of many formats of Task-based simulation available to the examiners. There is no guarantee that the exam of any one candidate will have a DRS or any other particular format.

Why have DRS been added to the CPA Exam?

The AICPA conducted a Practice Analysis from 2014-2015 in which one main finding was clear: firms are expecting newly licensed CPAs on their staff to perform at a higher level—and they aren't. So, the AICPA is raising the bar with a revamped CPA Exam that more authentically tests candidates on the tasks and skill level that will be required of them as newly licensed CPAs. The introduction of DRS in 2016 was the first step in this larger initiative, with additional changes that become effective on April 1, 2017.

What do DRS test?

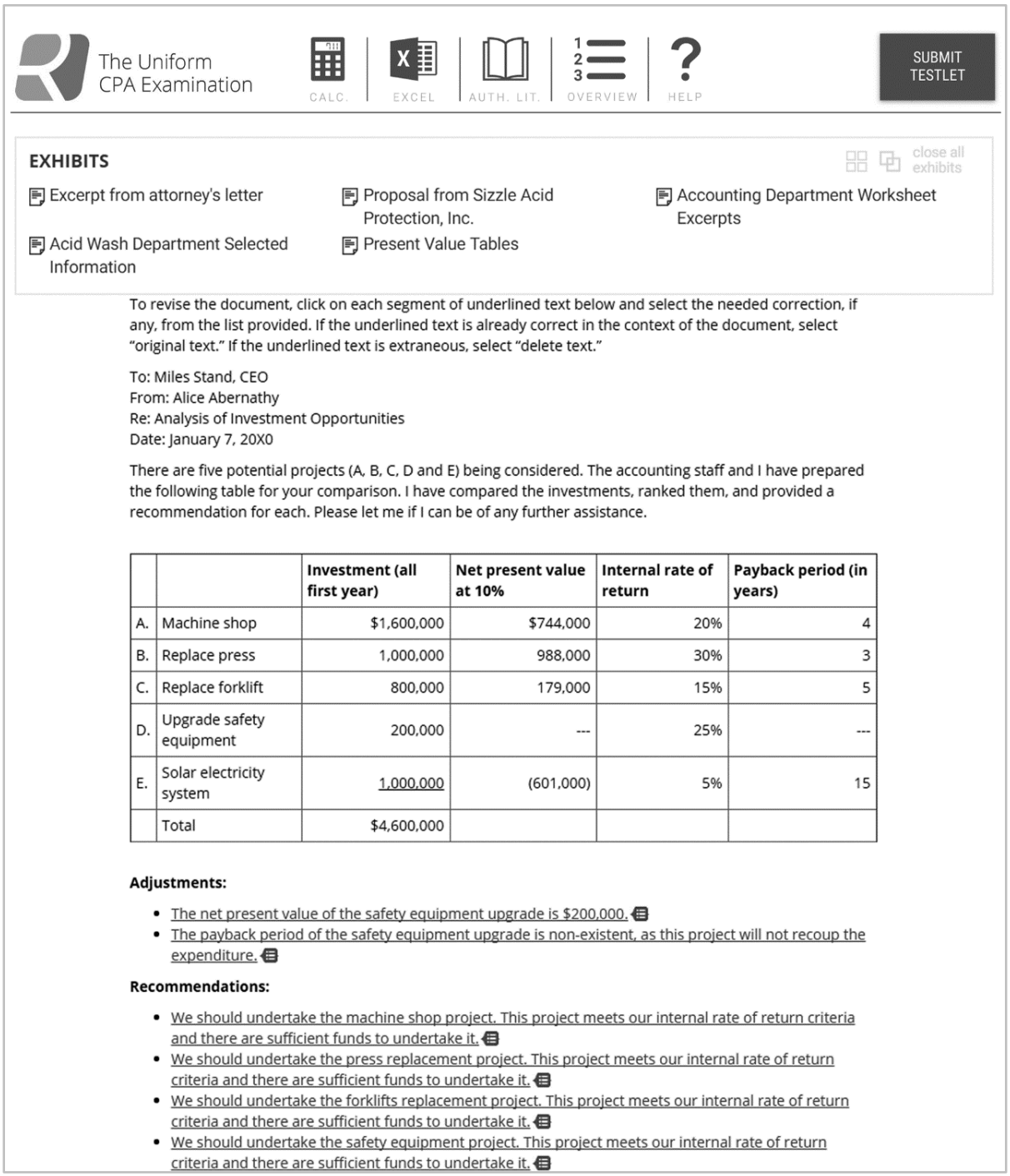
Up until recently, the CPA Exam has only tested candidates on the skill levels *Remembering & Understanding* and *Application* (skill levels based on Bloom's Taxonomy of Educational Objectives). To meet industry demands for the CPA Exam to test at a higher skill level, the CPA Exam is pivoting to test the higher order skills *Analysis* and *Evaluation* (Evaluation in AUD only). As a direct correlation to this exam evolution, DRS problems are designed to test these higher order skills by requiring candidates to analyze and evaluate documents they might see in the work force.

How a DRS works

As shown below, the DRS will present several buttons and exhibits:

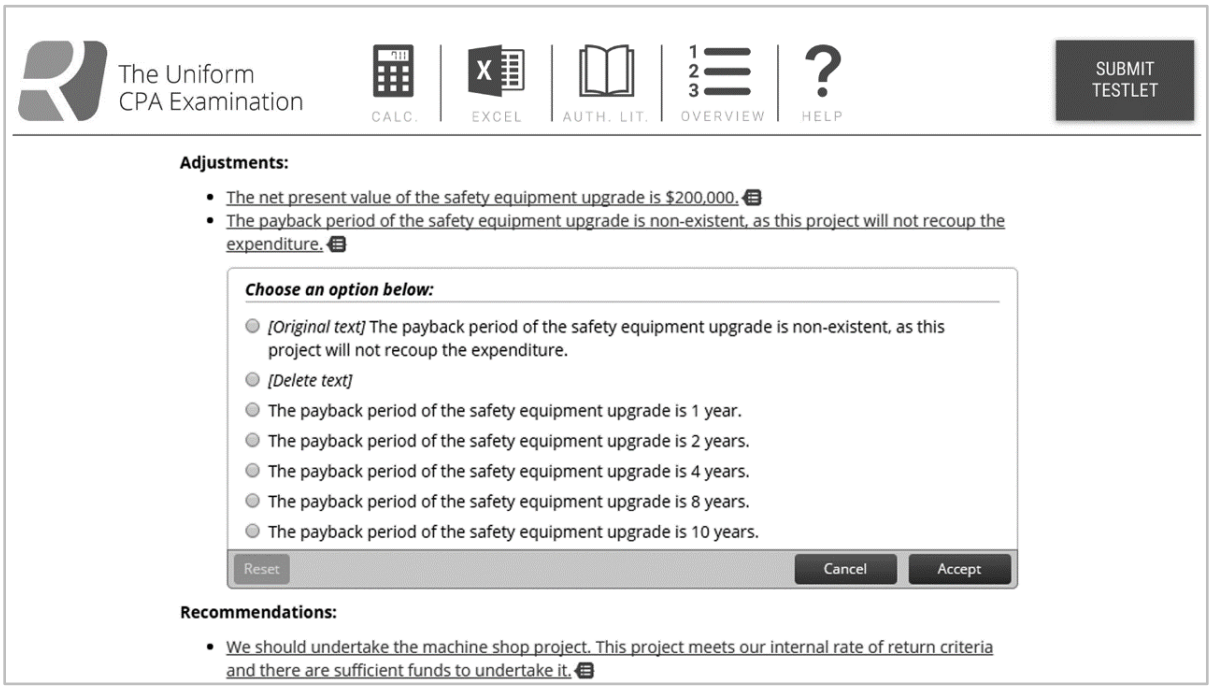
- **Authoritative Literature**: Which is available on all task-based simulations (except in BEC)
- **Help**: Explanation of how to answer the problem
- **Exhibits**: A series of supporting documents which may, or may not, help candidates complete the problem

Notice the highlighted items within the main document. These represent the specific sentences or phrases that the candidate is required to analyze.

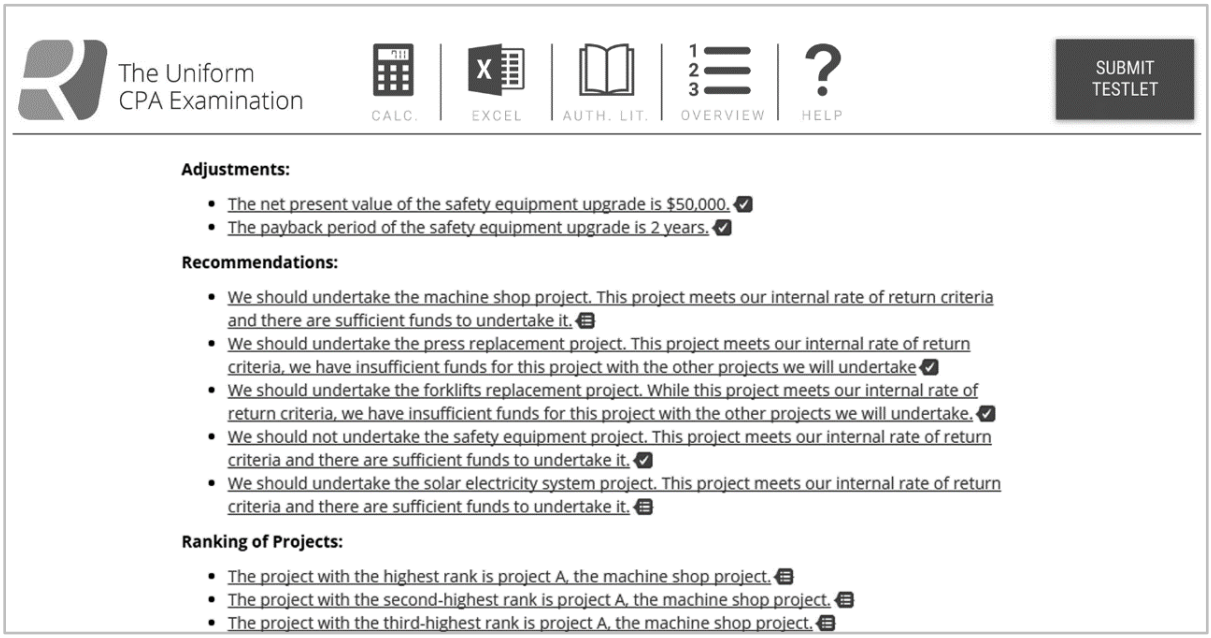


		Investment (all first year)	Net present value at 10%	Internal rate of return	Payback period (in years)
A.	Machine shop	$1,600,000	$744,000	20%	4
B.	Replace press	1,000,000	988,000	30%	3
C.	Replace forklift	800,000	179,000	15%	5
D.	Upgrade safety equipment	200,000	---	25%	---
E.	Solar electricity system	1,000,000	(601,000)	5%	15
	Total	$4,600,000			

To address each item within the problem, click on the highlighted phrase to see answer options. Each item will include the option to leave original text, delete text, or edit the text using the provided edit choices.



Once an item has been answered, a checkmark icon will appear next to the item in the document.



Approaching a BEC DRS

Step 1 – **Get the lay of the land**. YOU are the CPA – what is being asked of you? Skim over all the content in the Document Review Simulation to find out. You could be asked to do any of the following:

- Review the work of others – use your professional judgment, professional skepticism, and technical expertise to identify issues or correct errors. ← likely for BEC!
- Plan the work of others.
- Analyze and choose the best course of action from various alternatives presented. ← very likely for BEC!
- Address a client's technical questions and requests. ← likely for BEC!
- Draw on knowledge that is more extensively tested in a different exam section – detailed FAR knowledge may be expected for an BEC DRS, for instance. ← very likely for BEC!

Step 2 – Mentally note the gist of the DRS. "OK, this problem is about me, the CPA, reviewing the work of a staff member. Specifically, I must review a capital budgeting memo a staff member has drafted, review the accompanying documentation, and make changes to the memo as necessary."

Step 3 – Note the DRS subquestions. Briefly note down each DRS subquestion on your scratch whiteboard – you bought a handheld whiteboard just for CPA Exam study, right? Use your own shorthand. For instance, you might write:

1 determine NPV for D
2 " payback period for D
3 recommend projects
4 "
5 "
6 "
7 "
8 rank projects
9 "
10 "
11 "
12 "

Step 4 (Optional) – Choose an order of attack. Consider customizing the order in which you approach questions. It won't always be possible to tell, but if a few subquestions appear to be more time-consuming than others, consider moving them to the back of the queue. We don't know for sure, but we suspect each DRS subquestion is worth exactly as much as all the others—there are no bonus points for getting the most time-consuming ones right. Therefore, do the easiest ones first.

In this particular DRS, it seems we must determine the NPV and payback period in order to address the other items, so we will do items number 1 and 2 first. It might help to rank projects before making recommendations—so we will answer items 8 through 12 next. Finally, we will answer items 3 through 7.

Step 5 – Attack each subquestion one at a time. In either the default or custom order, work on each subquestion one at a time in order to be as efficient as possible to avoid getting overwhelmed. Remember that the necessary information for any one subquestion will almost certainly be contained across multiple documents.

Try to focus strictly on one subquestion at a time, but if you find yourself spending too much time on any one subquestion, make a tactical decision to skip it and move on to the next one. You may even decide to leave that subquestion undone and only return to it after completing other TBSs in your TBS testlet.

Check off each subquestion on your list as you complete it.

Step 6 – Go through a process of elimination for each subquestion.

Each DRS subquestion is similar to a multiple-choice question. The process of elimination, therefore, is a great tactic to employ. You can first eliminate **documents** and then **answer choices**.

Read the subquestion and all of its answer choices first.

For instance, the subquestion with default text "The net present value of the safety equipment upgrade is $200,000." appears to be about the net present value (NPV) of the safety equipment upgrade for the acid wash department. Briefly skim over each document in the Exhibits. Note any documents that clearly have no information about the net present value of the safety equipment upgrade for the acid wash department, and **ignore them**. Then hone in on the documents that do appear relevant.

As you focus on the relevant documents, eliminate answer choices one by one. That does not work well for this question; we must perform a calculation to know which is correct.

Follow this process of elimination for each subquestion, first eliminating documents, then answer choices. Even in cases (such as this one) where you're not sure there is a clear "winner" answer choice, you will at least have eliminated some irrelevant resources and the clear losers and given yourself a fighting chance.

To address the subquestion, we have to calculate the NPV of project D.

Several items in the available documentation are relevant to this subquestion.

- The first document is an excerpt from an attorney's letter. It relates to the additional safety measures required in the acid wash department.
- The second document is a bid from a contractor to install the additional safety measures required in the acid wash department.
- The third document is selected information on the acid wash department.
- The fifth document is a pair of present value tables. These contain information we need to calculate the net present value of a project.

The initial investment amount for project D (safety upgrades) comes from the second document. Apparently, Major must forego the revenues from the acid wash department unless the safety measures are installed—we know this from the attorney's letter, so the cash flows from the revenues (less the costs of goods sold) are used to evaluate this project—we get these from the third document. The present value factors come from the fifth document. We determine the NPV (at the 10% hurdle rate provided in the scenario) to be approximately $150,000 (see BEC Section 3 for details). Deleting the text is inappropriate as the omission in the table should be corrected.

NPV (safety upgrade, 10%) = PVS ($45,000, 1 year, 10%) + PVA ($59,000, years 2 through 10, 10%) – investment = $40,910 + $308,894 - $200,000 = $149,804

PVS ($45,000, 1 year, 10%) = ($45,000 x 0.9091) = $40,910

PVS ($1, 1 year, 10%) = $0.9091 (from PVS table, 1 year row, 10% column)

PVA ($59,000, years 2 through 10, 10%) = PVA ($59,000, 10 years, 10%) – PVS ($59,000, 1 year, 10%)
PVA ($1, 10 years, 10%) = 6.1446 (from PVA table, 10 year row, 10% column)
= ($59,000 x 6.1446) – ($59,000 x 0.9091)
= $362,531 - $53,637 = $308,894

The response to be selected will be, "The net present value of the safety equipment upgrade is $150,000."

This elimination process will be more useful for other subquestions in this DRS than it was for the first one. For instance, for subquestions 3 through 7, several similar responses can be eliminated for all projects. Consider the following:

- [Delete text] The instructions from the CFO ask for a recommendation for each project—this response will be inappropriate for all five subquestions concerning recommendations.
- We should undertake the _____ project. This project does not meet our internal rate of return criteria. If a project does not meet the IRR criteria, it should not be undertaken.
- We should undertake the _____ project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake. If we do not have funds for a project, it cannot be undertaken.
- We should not undertake the _____ project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it. If a project does meets the IRR criteria and there are sufficient funds to undertake it, it should be undertaken.

We have eliminated half of the responses for these five subquestions.

Sample BEC DRS

Scroll down to complete all parts of this task.

Major Manufacturing will receive a windfall. Of this money, $3,500,000 is not earmarked for taxes, dividends, or an investment. Shareholders are not eager for an increase either in dividends or debt. Money not used for investment will be distributed to shareholders. Generally, the hurdle rate is 10%. As an S corporation, Major does not pay any income taxes.

Miles Stand, the CEO, asked the accounting staff to provide a table of the potential investments in Major's operations to Alice Abernathy so that she could compare the investments, rank each of them that exceeds the hurdle rate, and make a recommendation as to which investments or combination of investments, if any, are appropriate. Unfortunately, the accounting staff neglected to finish the chart for project D and Alice is unsure of how to complete it, so she needs you to look over the documents and help straighten out her memo.

Major has four manufacturing departments. Work in each department is finished at the fiscal year-end for extensive cleaning and repairs, so there is no work-in-process inventory at the fiscal year-end. Materials move through only one manufacturing department.

Amend the summary memo that Alice has drafted, as appropriate. Round the net present value to the nearest $1,000. Round the payback period to the closest year.

To revise the document, click on each segment of underlined text below and select the needed correction, if any, from the list provided. If the underlined text is already correct in the context of the document, select "original text." If the underlined text is extraneous, select "delete text."

To: Miles Stand, CEO
From: Alice Abernathy
Re: Analysis of Investment Opportunities
Date: January 7, 20X0

There are five potential projects (A, B, C, D and E) being considered. The accounting staff and I have prepared the following table for your comparison. I have compared the investments, ranked them, and provided a recommendation for each. Please let me if I can be of any further assistance.

		Investment (all first year)	Net present value at 10%	Internal rate of return	Payback period (in years)
A.	Machine shop	$1,600,000	$744,000	20%	4
B.	Replace press	1,000,000	988,000	30%	3
C.	Replace forklifts	800,000	179,000	15%	5
D.	Upgrade safety equipment	200,000	---	25%	---
E.	Solar electricity system	1,000,000	(601,000)	5%	15
	Total	$4,600,000			

Adjustments:

1. The net present value of the safety equipment upgrade is $200,000.

2. The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.

Recommendations:

3. We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

4. We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

5. We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

6. We should undertake the safety equipment upgrade project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

7. We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

Ranking of Projects:

8. The project with the highest rank is project A, the machine shop project.

9. The project with the second-highest rank is project A, the machine shop project.

10. The project with the third-highest rank is project A, the machine shop project.

11. The project with the fourth-highest rank is project A, the machine shop project.

12. The project with the lowest rank is project A, the machine shop project.

Items for Analysis

The net present value of the safety equipment upgrade is $200,000.

1. Choose an option below:
   - [Original text] The net present value of the safety equipment upgrade is $200,000.
   - [Delete text]
   - The net present value of the safety equipment upgrade is $0.
   - The net present value of the safety equipment upgrade is $50,000.
   - The net present value of the safety equipment upgrade is $100,000.
   - The net present value of the safety equipment upgrade is $150,000.

The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.

2. Choose an option below:

- [Original text] The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.
- [Delete text]
- The payback period of the safety equipment upgrade is 1 year.
- The payback period of the safety equipment upgrade is 2 years.
- The payback period of the safety equipment upgrade is 4 years.
- The payback period of the safety equipment upgrade is 8 years.
- The payback period of the safety equipment upgrade is 10 years.

We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

3. Choose an option below:

- [Original text] We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should not undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

4. Choose an option below:

- [Original text] We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

- We should not undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

5. Choose an option below:

- [Original text] We should undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the forklifts replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the forklifts replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the forklifts replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the forklifts replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

6. Choose an option below:

- [Original text] We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the safety equipment project. This project does not meet our internal rate of return criteria.
- We should undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the safety equipment project. This project does not meet our internal rate of return criteria.

- We should not undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.

7. Choose an option below:

- [Original text] We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should not undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

The project with the highest rank is project A, the machine shop project.

8. Choose an option below:

- [Original text] The project with the highest rank is project A, the machine shop project.
- [Delete text]
- The project with the highest rank is project B, the press replacement project.
- The project with the highest rank is project C, the forklifts replacement project.
- The project with the highest rank is project D, the safety upgrade project.
- The project with the highest rank is project E, the solar electricity system project.

The project with the second-highest rank is project A, the machine shop project.

9. Choose an option below:

- [Original text] The project with the second-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the second-highest rank is project B, the press replacement project.
- The project with the second-highest rank is project C, the forklifts replacement project.
- The project with the second-highest rank is project D, the safety upgrade project.
- The project with the second-highest rank is project E, the solar electricity system project.

The project with the third-highest rank is project A, the machine shop project.

10. Choose an option below:

- [Original text] The project with the third-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the third-highest rank is project B, the press replacement project.
- The project with the third-highest rank is project C, the forklifts replacement project.
- The project with the third-highest rank is project D, the safety upgrade project.
- The project with the third-highest rank is project E, the solar electricity system project.

The project with the fourth-highest rank is project A, the machine shop project.

11. Choose an option below:

- [Original text] The project with the fourth-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the fourth-highest rank is project B, the press replacement project.
- The project with the fourth-highest rank is project C, the forklifts replacement project.
- The project with the fourth-highest rank is project D, the safety upgrade project.
- The project with the fourth-highest rank is project E, the solar electricity system project.

The project with the lowest rank is project A, the machine shop project.

12. Choose an option below:

- [Original text] The project with the lowest rank is project A, the machine shop project.
- [Delete text]
- The project with the lowest rank is project B, the press replacement project.
- The project with the lowest rank is project C, the forklifts replacement project.
- The project with the lowest rank is project D, the safety upgrade project.
- The project with the lowest rank is project E, the solar electricity system project.

Exhibits

Excerpt from attorney's letter

Excerpt from Attorney's Letter

A new regulation (AW13908.78) goes into effect as of January 1, 20X1. Without additional safety measures, the acid wash department will have to discontinue operations. Please contact me for additional details.

Proposal from Sizzle Acid Protection, Inc.

Sizzle Acid Protection, Inc.

1200 Industrial Road
Fort Myers, FL
1-800-555-BURN

Acid remediation shower	$150,000
Acid neutralization system	47,000
Safety goggles (case of 144)	1,000
Employee safety signage	1,000
Initial training for employees	1,000
Total	$200,000

Installation from December 10, 20X0, to December 25, 20X0, with 10 days of unlimited access from 7:00 a.m. to 6 p.m.
Training finished by December 31, 20X1, on any non-holiday weekday of your choice.
Guaranteed compliant with regulation AW13908.78 for 10 years, given no changes to the regulation.
Offer valid until November 30.

Acid wash department selected information

Major Manufacturing - Acid Wash Department
Select Amounts ($ in 1,000s)
January 3, 20X0

Plant and Equipment	
Historical Cost	$2,000
Deprecation	1,500
Salvage Value	50

Anticipated amounts	**20X1 (Year 1)**	**20X2–20X10 (Years 2-10)**
Capacity	96%	98%
Sales dollars	683	709
Cost of goods sold	638	650
Sales less cost of goods sold	45	59

Accounting Department Worksheet Excerpts

Major Manufacturing Company
Comparison of Potential Investments
January 21, 20X0

Project	A	B	C	D	E
Investment	1,600,000	1,000,000	800,000	200,000	1,000,000
Estimated annual cash inflow (ACI)	381,500	323,500	159,400		65,000
Investment divided by ACI	4.2	3.1	5.0		15.4
Payback period (rounded)	4	3	5		15
IRR—see below (rounded)	20%	30%	15%		5%
Interest rate	10%	15%	20%	25%	30%
Present value of an annuity factor	6.1446	5.0188	4.1925	3.5705	3.0915
Present value of project A ACI	2,344,165	1,914,672	1,599,439	1,362,146	1,179,407
Net present value, project A	744,165	314,672	-561	-237,854	-420,593
Present value of project B ACI	1,987,778	1,623,582	1,356,274	1,155,057	1,000,100
Net present value, project B	987,778	623,582	356,274	155,057	100
Present value of project C ACI	979,449	799,997	668,285	569,138	492,785
Net present value, project C	179,449	-3	-131,716	-230,862	-307,215

Present Value Tables

Present Value of a $1 Single Sum (PVS)

Period	5%	10%	15%	20%	25%	30%
1	0.9524	0.9091	0.8696	0.8333	0.8000	0.7692
2	0.9070	0.8264	0.7561	0.6944	0.6400	0.5917
3	0.8638	0.7513	0.6575	0.5787	0.5120	0.4552
4	0.8227	0.6830	0.5718	0.4823	0.4096	0.3501
5	0.7835	0.6209	0.4972	0.4019	0.3277	0.2693
6	0.7462	0.5645	0.4323	0.3349	0.2621	0.2072
7	0.7107	0.5132	0.3759	0.2791	0.2097	0.1594
8	0.6768	0.4665	0.3269	0.2326	0.1678	0.1226
9	0.6446	0.4241	0.2843	0.1938	0.1342	0.0943
10	0.6139	0.3855	0.2472	0.1615	0.1074	0.0725
30	0.2314	0.0573	0.0151	0.0042	0.0012	0.0004
83	0.0174	0.0004	0.0000	0.0000	0.0000	0.0000

Present Value of a $1 Annuity (PVA)

Period	5%	10%	15%	20%	25%	30%
1	0.9524	0.9091	0.8696	0.8333	0.8000	0.7692
2	1.8594	1.7355	1.6257	1.5278	1.4400	1.3609
3	2.7232	2.4869	2.2832	2.1065	1.9520	1.8161
4	3.5460	3.1699	2.8550	2.5887	2.3616	2.1662
5	4.3295	3.7908	3.3522	2.9906	2.6893	2.4356
6	5.0757	4.3553	3.7845	3.3255	2.9514	2.6427
7	5.7864	4.8684	4.1604	3.6046	3.1611	2.8021
8	6.4632	5.3349	4.4873	3.8372	3.3289	2.9247
9	7.1078	5.7590	4.7716	4.0310	3.4631	3.0190
10	7.7217	6.1446	5.0188	4.1925	3.5705	3.0915
30	15.3725	9.4269	6.5660	4.9789	3.9950	3.3321
83	19.6514	9.9963	6.6666	5.0000	4.0000	3.3333

Solution to BEC DRS

This question is asking the candidate to determine what projects to recommend, their ranking, and to correct some figures in the provided information. Items in the memo that are not underlined are presumed to be appropriate. As a result, the candidate need not address them.

1. The first underlined item indicates "The net present value of the safety equipment upgrade is $200,000." and, when clicked upon, the following choices appear:

- [Original text] The net present value of the safety equipment upgrade is $200,000.
- [Delete text]
- The net present value of the safety equipment upgrade is $0.
- The net present value of the safety equipment upgrade is $50,000.
- The net present value of the safety equipment upgrade is $100,000.
- The net present value of the safety equipment upgrade is $150,000.

To determine what correction, if any, needs to be made, the candidate will have to review the available documentation.

- The first document is an excerpt from an attorney's letter. It relates to the additional safety measures required in the acid wash department.
- The second document is a bid from a contractor to install the additional safety measures required in the acid wash department.
- The third document is selected information on the acid wash department.
- The fourth document does not appear to relate to the acid wash department.
- The fifth document is a pair of present value tables. These contain information we need to calculate the net present value of a project.

The initial investment amount for project D (safety upgrades) comes from the second document. Apparently, Major must forego the revenues from the acid wash department unless the safety measures are installed—we know this from the attorney's letter, so the cash flows from the revenues (less the costs of goods sold) are used to evaluate this project—we get these from the third document. The present value factors come from the fifth document. We determine the NPV (at the 10% hurdle rate provided in the scenario) to be approximately $150,000 (see BEC Section 3 for details). Deleting the text is inappropriate as the omission in the table should be corrected.

NPV (safety upgrade, 10%) = PVS ($45,000, 1 year, 10%) + PVA ($59,000, years 2 through 10, 10%) – investment = $40,910 + $308,894 - $200,000 = $149,804

PVS ($45,000, 1 year, 10%) = ($45,000 x 0.9091) = $40,910
PVS ($1, 1 year, 10%) = $0.9091 (from PVS table, 1 year row, 10% column)

PVA ($59,000, years 2 through 10, 10%) = PVA ($59,000, 10 years, 10%) – PVS ($59,000, 1 year, 10%)
PVA ($1, 10 years, 10%) = 6.1446 (from PVA table, 10 year row, 10% column)
= ($59,000 x 6.1446) – ($59,000 x 0.9091)
= $362,531 - $53,637 = $308,894

The item to be selected will be:

- ***The net present value of the safety equipment upgrade is $150,000.***

2. The next underlined item indicates "The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure." The choices are:

- [Original text] The payback period of the safety equipment upgrade is non-existent, as this project will not recoup the expenditure.
- [Delete text]
- The payback period of the safety equipment upgrade is 1 year.
- The payback period of the safety equipment upgrade is 2 years.
- The payback period of the safety equipment upgrade is 4 years.
- The payback period of the safety equipment upgrade is 8 years.
- The payback period of the safety equipment upgrade is 10 years.

As we have done most of the work evaluating the safety upgrade project already, we don't have to do much to address this item. Using the same documents, we determine the payback period is about 3.6 years—which rounds to 4 years. Calculations follow:

$200,000 cost – $45,000 year 1 cash flow = $155,000 amount remaining after 1st year.
$155,000 remaining investment / $59,000 cash flow for subsequent years = 2.6 years.
2.6 years +1st year = 3.6 years.

Deleting the text is inappropriate as the omission in the table should be corrected.

The item to be selected will be:

- ***The payback period of the safety equipment upgrade is 4 years.***

3. The next underlined item indicates "We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should not undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

To determine what correction, if any, needs to be made, the candidate will have to review the available documentation.

- Besides the table in the memo, the only document that refers to this project is the Accounting Department Worksheet Excerpts; however, everything you need is in the table itself, along with the NPV and the payback period you calculated for project D.

As there is more money required to fund all the projects than is available, we must compare them and decide on the most profitable projects.

While, generally, it is best to concentrate on one item at a time, this simulation does not lend itself to that approach.

Knowing that project E has an IRR of only 5%, which does not meet the hurdle rate, we are left with $3,500,000 to invest and projects requiring $4,600,000 – $1,000,000 = $3,600,000. Let's go ahead and rank the projects. As the directions say to rank the projects that exceed the hurdle rate, we know that we can now ignore project E and rank the other projects by their IRR. So, after a seemingly slow start, we can address five subquestions (8 through 12) in short order.

4. The underlined item indicates "The project with the highest rank is project A, the machine shop project." The choices are:

- [Original text] The project with the highest rank is project A, the machine shop project.
- [Delete text]
- The project with the highest rank is project B, the press replacement project.
- The project with the highest rank is project C, the forklifts replacement project.
- The project with the highest rank is project D, the safety upgrade project.
- The project with the highest rank is project E, the solar electricity system project.

Project B has the highest IRR of 30%. Deleting the text is inappropriate as the instructions were to rank the projects exceeding the hurdle rate.

The item to be selected will be:

- ***The project with the highest rank is project B, the press replacement project.***

5. The underlined item indicates "The project with the second-highest rank is project A, the machine shop project." The choices are:

- [Original text] The project with the second-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the second-highest rank is second-highest B, the press replacement project.
- The project with the second-highest rank is second-highest C, the forklifts replacement project.
- The project with the second-highest rank is second-highest D, the safety upgrade project.

- The project with the second-highest rank is second-highest E, the solar electricity system project.

Project D has the second-highest IRR of 25%. Deleting the text is inappropriate as the instructions were to rank the projects exceeding the hurdle rate.

The item to be selected will be:

- ***The project with the second-highest rank is project D, the safety upgrade project.***

6. The underlined item indicates "The project with the third-highest rank is project A, the machine shop project." The choices are:

- [Original text] The project with the third-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the third-highest rank is project B, the press replacement project.
- The project with the third-highest rank is project C, the forklifts replacement project.
- The project with the third-highest rank is project D, the safety upgrade project.
- The project with the third-highest rank is project E, the solar electricity system project.

Project A has the third-highest IRR of 20%. Deleting the text is inappropriate as the instructions were to rank the projects exceeding the hurdle rate.

The item to be selected will be:

- ***[Original text] The project with the third-highest rank is project A, the machine shop replacement project.***

7. The underlined item indicates "The project with the fourth-highest rank is project A, the machine shop project." The choices are:

- [Original text] The project with the fourth-highest rank is project A, the machine shop project.
- [Delete text]
- The project with the fourth-highest rank is project B, the press replacement project.
- The project with the fourth-highest rank is project C, the forklifts replacement project.
- The project with the fourth-highest rank is project D, the safety upgrade project.
- The project with the fourth-highest rank is project E, the solar electricity system project.

Project C has the fourth-highest IRR of 15%. Deleting the text is inappropriate as the instructions were to rank the projects exceeding the hurdle rate.

The item to be selected will be:

- ***The project with the fourth-highest rank is project C, the forklifts replacement project.***

8. The last underlined item indicates "The project with the lowest rank is project A, the machine shop project." The choices are:

- [Original text] The project with the lowest rank is project A, the machine shop project.
- [Delete text]
- The project with the lowest rank is project B, the press replacement project.
- The project with the lowest rank is project C, the forklifts replacement project.
- The project with the lowest rank is project D, the safety upgrade project.
- The project with the lowest rank is project E, the solar electricity system project.

Clearly, project E is the lowest ranked project, but we do not select, "The project with the lowest rank is project E, the solar electricity system project." Our instructions were to rank all of the projects that meet the minimum profitability criteria of exceeding the hurdle rate. A project with an IRR of 5% does not meet these criteria, so we will merely delete the text.

As a result, the item to be selected will be:

- ***[Delete text]***

At long last, we return to the start of the recommendations (subquestion 3).

Simply, we recommend the projects in the same order as the ranking, until we run out of capital to invest. Major has sufficient capital to invest in projects A, B, and D. While project C meets the minimum profitability requirements, Major doesn't have enough capital available to fund it. Project E does not meet the minimum profitability requirements; Major would not invest in project E even if it had extra capital.

9. Again, the underlined item indicates "We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the machine shop project. This project does not meet our internal rate of return criteria.
- We should not undertake the machine shop project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We have sufficient capital to invest in projects A, B, and D.

The item to be selected will be:

- ***[Original text] We should undertake the machine shop project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.***

10. The underlined item for number 4 indicates "We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the press replacement project. This project meets our internal rate of return criteria; we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We have sufficient capital to invest in projects A, B, and D.

The item to be selected will be:

- ***[Original text] We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.***

11. The underlined item for number 5 indicates "We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

- We should not undertake the press replacement project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the press replacement project. This project does not meet our internal rate of return criteria.
- We should not undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We have sufficient capital to invest in projects A, B, and D. While project C meets the minimum profitability requirements, we haven't enough capital available to fund it. Deleting the text is inappropriate as a recommendation is required.

The item to be selected will be:

- ***We should not undertake the press replacement project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.***

12. The underlined item for number 6 indicates "We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the safety equipment project. This project does not meet our internal rate of return criteria.
- We should undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the safety equipment project. This project does not meet our internal rate of return criteria.
- We should not undertake the safety equipment project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

We have sufficient capital to invest in projects A, B, and D.

The item to be selected will be:

- ***[Original text] We should undertake the safety equipment project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.***

13. The underlined item for number 7 indicates "We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it." The choices are:

- [Original text] We should undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- [Delete text]
- We should undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.
- We should not undertake the solar electricity system project. This project meets our internal rate of return criteria and there are sufficient funds to undertake it.
- We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.
- We should not undertake the solar electricity system project. While this project meets our internal rate of return criteria, we have insufficient funds for this project with the other projects we will undertake.

Project E does not meet the minimum profitability requirements; we would not invest in it even if we had extra capital. Deleting the text is inappropriate as a recommendation is required.

As a result, the item to be selected will be:

- ***We should not undertake the solar electricity system project. This project does not meet our internal rate of return criteria.***

Subquestions 8 through 12 already were addressed.